THE

LAND'S END DISTRICT:

ITS ANTIQUITIES,

NATURAL HISTORY, NATURAL PHENOMENA

AND SCENERY.

ALSO, A BRIEF MEMOIR OF

RICHARD TREVITHICK, C.E.

BY

RICHARD EDMONDS,

(*Late of Penzance*),

SECRETARY FOR CORNWALL TO THE CAMBRIAN

ARCHÆOLOGICAL ASSOCIATION.

WITH A MAP, SIX PLATES, AND SEVERAL WOODCUTS.

LONDON:

J. RUSSELL SMITH, 36, SOHO SQUARE.

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PREFACE.

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The next ninety pages treat of extraordinary agitations of the sea, earthquakes, whirlwinds, storms, effects of lightning, auroras, calling of the sea, remarkable meteorological facts, sand hillocks with imbedded land shells, and other interesting natural phenomena—which I have also described in the *Edinburgh New Philosophical Journal, the British Association Reports,* and the *Transactions of the Royal Societies of Cornwall.*

The succeeding ninety pages (161-253) are occupied with a tour round the district, and contain accounts of Penzance and its climate and early crops, St. Michael's Mount, ancient crosses, the fisheries, luminosity of the sea, submarine forests, cliff caverns, boulders, raised beaches, the Armed Knight, remarkable intermixtures of granite and slate, lighthouses, submarine mines, contemplated breakwaters, Sir Humphry Davy, Richard Trewavas, the Monks of St. Matthew, the Cornish Chough, the recent monument to Dolly Pentreath, &c. &c.

The brief memoir of Trevithick I published in the *Edinburgh New Philosophical Journal* for October, 1859.

The subjects are thus evidently of general interest, although arising from one locality.

THE AUTHOR.

2, PORTLAND TERRACE, PLYMOUTH,
July, 1862.

TO

HER MAJESTY QUEEN VICTORIA.

Do Thou the waves—do Thou the nations—rule!
And let thy sceptre be the suasive power
Of an unselfish godlike policy—
Doing towards all other realms as Thou
Would'st have all other realms to do t'wards Thee;
While thine own people love thy righteous sway,
And feel thy service perfect liberty.
Thus shall the praise of all the wise and good
Throughout the world, continue to be thine,
And God, thy God, shall bless Thee evermore.

R. E.

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THE

CELTIC AND OTHER ANTIQUITIES

OF THE

LAND'S END DISTRICT

OF

CORNWALL.

THE CELTIC AND OTHER ANTIQUITIES OF THE LAND'S END DISTRICT OF CORNWALL.

"The various *castles, circles, cromlêhs* and primitive *customs* still existing in this part of the island are objects of peculiar curiosity to every person who is zealous in the cause of British Antiquity."—Britton and Brayley's *England and Wales,* ii. p. 501.

CHAPTER I.

Introduction—the District defined—the Cornish Language last Spoken here—Character—Density of its Population, Ancient and Modern—St. Michael's Mount, the Ancient Iktin—Origin of the Names Iktin and Britain—Frequented by the Tyrians —Remains of an Ancient Bronze Furnace, used probably for Melting *Tin—"Jews' Houses" for* Smelting *Tin—Similarity of Ancient and Modern Processes of Smelting and Melting—Origin of the Name Marazion—the Period when the Phœnicians first visited Mount's Bay—Ancient Bronze Image.*

HAVING at the request of the Cambrian Archæological Association accepted its Corresponding Secretaryship for Cornwall, it becomes my duty, in the silence of abler writers, to describe the antiquities of the very small peninsular district (wherein I reside) which forms the south-western extremity of Cornwall, and is so nearly an island, that the distance between the highest tide in Mount's Bay on the south, and that in the estuary of St. Ives Bay on the north, is only three miles. This district is probably more remarkable for the variety of its prehistoric remains than any other of equal extent in Great Britain.

The Cornish language, which, like the Welsh, was a dialect of the Celtic, has long ceased to be spoken, although, in the conversation of the rural population, there is still a very considerable sprinkling of Cornish words quite unintelligible to strangers. The last survivor of those who had in their youth been accustomed to converse in pure Cornish appears to have been Dolly

Pentreath, of Mousehole, near Penzance, who died in 1778, aged 102 years. The parishes in Cornwall in which it was commonly spoken, up to the commencement of the last century, were exclusively those along the coasts of Mount's Bay and St. Ives Bay, and the few others in this district west of these bays.[1] As this district thus retained the ancient language later than any other part of the county, a glance at its present population will be interesting, as indicating in some degree the character of its ancient inhabitants.

"Trained from youth (says a writer in the *Edinburgh Review*, for January, 1851) in employments requiring much mental exertion, and dependent for subsistence not on mere wages, or the mere produce of a narrow parcel of soil, but on branches of active industry, where he himself shares in the responsibility, profit and loss; acquiring, by daily practice, habits at once of the boldest speculation, and the most minute and calculating forethought, the miner, fisherman, or small tradesman of West Cornwall not only exhibits powers, not often developed elsewhere in his rank of life, but influences also by his example the general tone of feeling among the labouring classes. Their fishermen range the whole coast of the south of England, and have turned the seas of Ireland, neglected by its inhabitants, into preserves of their own; their miners disinter the hidden wealth of Brazil and Australia."—p. 90.

And Warner, in his *Tour through Cornwall*, in 1808, says, "its men are sturdy, bold, honest and sagacious; its women lovely and modest, courteous and unaffected."

[1] Lhuyd's Archæologia Britannica, ... from Collections and Observations in Travels thro' Wales, Cornwall, Bas-Bretagne, Ireland and Scotland, 1707, p. 253. Much of what remains of the Cornish language may be found in the work now referred to; and in Dr. Pryce's *Cornish Grammar, and Cornish-English Vocabulary*, with an Appendix containing "The Lord's Prayer, the Belief, and the Commandments, in the ancient and modern Cornish, and a collection of Proverbs, Mottoes, Rhymes, Songs, &c., in the modern or vulgar Cornish," 1790; and in Davies Gilbert's edition, in 1827, of the ancient Cornish drama, entitled *The Creation of the World with Noah's Flood*, written A.D. 1611, to which are added the first chapter of Genesis, the Lord's Prayer, the Ten Commandments, dialogues, proverbs, numerals, &c., in most of which the Cornish and the English are on opposite pages.

—p. 348. Mr. W. Wilkie Collins, too, after walking along the coasts of this peninsula in 1851, speaks in the most laudatory terms of the contented, kind, generous and hospitable dispositions and social virtues of the inhabitants.[2] And the opinion of a still more recent tourist is equally in their praise.[3]

These disinterested testimonies agree with what was recorded by Diodorus Siculus nineteen hundred years ago, who, after praising the British generally for their sincerity, integrity, and contented dispositions, says that the inhabitants of this district "excel in hospitality," and "are civilized in their mode of life."[4] The cause of this similarity of character between the ancient and the modern population is easily explained. The same mild climate, the same fertile fields producing two crops in the year, (as mentioned by Diodorus,[5]) the same mining, fishing, agricultural and mercantile employments, carried on principally by numerous small capitalists on their own resources; in short, the same causes which concurred anciently to raise the inhabitants of Mount's Bay in civilization, talents and courteous deportment above their fellow Cornishmen, have continued to maintain them in their relative superiority.

The ancient population, too, appears to have been, like the modern, considerably more dense than that of the rest of Cornwall. Its great density in very *ancient* times is evident, not only from the very numerous remains of ancient British towns, villages, huts and sepulchral barrows, still to be seen on our waste grounds, but also from the vast quantities of half-calcined human remains, mixed with charcoal, that have been, and are still being, in numberless places disturbed by the plough and new buildings. In *modern* times the parish of Madron, which includes Penzance, was the most populous parish in Cornwall in 1801, 1821 and 1841; the most populous

[2] Rambles beyond Railways, pp. 91, 92.
[3] Cornwall, its Mines and Miners, 1855, p. 272.
[4] The whole passage will be presently quoted.
[5] See the quotation in the next Chapter.

parishes in 1811, 1831 and 1851, having been, respectively, St. Austell, Redruth and Camborne, the central towns of the three great mining districts of Cornwall. The hundred of Penwith, in which the Land's End district is situated, is by far the most populous of the nine Cornish hundreds.

Of all places in this British Chersonesus, the most remarkable in ancient and modern times is St. Michael's Mount, the Iktin of Diodorus, and the earliest British port known in history. This natural pyramid of rocks—an island two-thirds of the day, and a quarter of a mile from the ancient town of Marazion—is, with its pier for ships, about a mile in circumference, and the aged and the young, the educated and the uneducated, the Englishman and the foreigner, all regard it as one of the most strikingly sublime and beautiful objects they have ever beheld; to which universal effect produced by its appearance, if we add the associations connected with it as a high place of druidical worship, and the great resort of the Phœnicians many centuries before the Christian era, and as having been in less ancient periods one of the most famous religious places in Europe, until its monastery and nunnery were converted into a military garrison, we need not wonder at the universal admiration it has obtained.[6] That "the Mount" should, therefore, have given its name to the bay which encloses it, is what every one would have expected; and it has in all probability given its name also to the most distinguished country on the globe, as I will now proceed to show.

The following is a literal translation of the passage in Diodorus Siculus, which describes the inhabitants of the Land's End district, and the manner in which the tin was obtained, prepared and exported, forty or fifty years before the commencement of our era :—

"The inhabitants of that extremity of Britain which is called Belerion,[7] both excel in hospitality, and also by reason of their

[6] Yet no British sovereign appears to have visited it until the 6th of September, 1846, when Her Majesty Queen Victoria landed there.

[7] This name (as a friend suggested to me) may have been derived

intercourse with foreign merchants are civilized in their mode of life. These prepare the tin, working very skilfully the earth which produces it. The ground is rocky, but has in it earthy veins the produce of which is wrought down, and melted, and purified. Then, when they have cast it into the form of cubes (or dice, *αστραγαλων ρυθμουὺς*) they carry it into a certain island adjoining to Britain, and called Iktis (*ικτις*).[8] For during the recess of the tide the intervening space is left dry, and they carry over abundance of tin to this place in their carts. And it is something peculiar that happens to the islands in these parts lying between Europe and Britain; for at the full tide, the intervening passage being overflowed, they appear islands, but when the sea retires a large space is left dry, and they are seen as peninsulas. From hence, then, the traders purchase the tin of the natives, and transport it into Gaul, and finally travelling through Gaul on foot, in about thirty days they bring their burdens on horses to the mouth of the river Rhone."[9]—(Book v.)

The British isle here referred to is now generally allowed to be St. Michael's Mount.[1] Indeed there is no other in Cornwall, or Britain, that corresponds with the description of the Greek historian.[2] But Diodorus calls it *Iktin*, not *Iktis*. All his translators, however, French and English, as well as Latin, finding the word in the accusative case, concluded *Iktis* to be the nominative, and therefore called it Iktis, although Iktin (assuming it to be declinable) might be the nominative with quite as

from the Phœnicians, whose god *Bel*, or *Baal*, the sun, (as will presently appear,) was very anciently worshipped here.

[8] In the original it is, "*εις την νῆσον προκειμενην μεν τῆς βρεττανικῆς ὀνομαζομενην δε Ικτιν.*"

[9] Dr. Barham, Transactions of the Royal Geological Society of Cornwall, iii. p. 88.

[1] See Sir H. de la Beche's *Cornwall, Devon, and Somerset*, p. 524. See also the papers of Mr. Carne on the "Geology of the Scilly Isles," in the *Cornwall Geological Transactions*, ii. p. 357, and vii. p. 153, in which he clearly shows that the tin of the Cassiterides *could not* have been the product of the Scilly Islands, as Borlase imagined.

[2] Those who once contended that the Isle of Wight is the Iktin, or Ictis, of Diodorus, referred to some unfounded traditions that, in his time, that isle was accessible from the mainland by carts at low water, and that the Mount was not; whereas both places in all probability are now just as they were in the time of Noah.—See Warner's *Cornwall*, p. 262.

much propriety as Iktis. That Iktin was the original name of the Mount, as recorded by Diodorus, receives confirmation from the fact of its most ancient name, after it became a religious cell, being *Dinsell*, or *Dynsull*,[3] a mere abbreviation, apparently, of *Iktincell* into *'Tincell*, T and D being interchangeable letters.

Iktin being thus evidently the ancient name of the Mount, let us dwell for a moment on its etymology, and on that of another name very dear to us. *Ik* is the Cornish word for "cove," or "port." Iktin, therefore, signifies "port-tin," or "tin-port,"[4] a name as appropriate, and at the same time as indefinite, as could have been adopted by the Phœnicians, who, as is well known, sought to conceal the place whence they procured their tin. So, too, with respect to the name *Bretin*, (pronounced by the French, *Bretagne;* and by the English, Britain,) as *bré* is the Cornish word for "mount," *Bre-tin* signifies "tin-mount," just as *Iktin* signifies "tin-port," and conveyed to strangers, and even to the Britons themselves who did not dwell in Cornwall, no more idea of the locality of this mount, than did the name "Tin Islands," *(Cassiterides,)* used by Herodotus four hundred years before Diodorus. Thus the country, as well as the mount from which the tin was shipped, appears to have derived its name very naturally from its chief export.[5] Dr. Maton, reversing this idea, suggested that the word tin might possibly have been derived from the original name of the

[3] Carew's Survey of Cornwall. Edition by Lord de Dunstanville, p. 376.

[4] The Cornish word *porth* is almost synonymous with *ik*, and generally *pre*cedes the word to which it is joined, as in the names *Porth-towan*, and *Porth-leven;* but it sometimes *suc*ceeds it, as in *Perran-porth*.

[5] The name by which tin was known amongst the Phœnicians and Chaldeans has undergone considerable changes since its introduction into European languages. While the Saxon, Dutch and Danish word for *tin* is the same as our own, the Swedish word is *tenn*, the German *zinn*, the French *etain*, the Latin *stannum*, the Irish *stan*, the Cornish *stean*, the Armoric *stean*, and also *staen;* the letter S in the last four words being probably a mere prefix, as in the modern word *sneeze* for *neeze*.—See *Job* xli. 18.

Mount from which it was anciently shipped, that name being Iktin of British origin, and "having no connection with the accusative case of the Greek language."[6] It is true that in the Cornish language the word *tin* is sometimes used as identical with *din*, "a fortress," but it must also have been used by the Cornish for the metal of that name; for if *tin*, as is generally supposed, be the ancient Phœnician word for that substance, it could not but have been communicated to the Cornish.

It may be inferred, from the passage above cited, that the spot where the tin was cast into the form of cubes, before its conveyance to the Mount, was very near the Mount. Now the place nearest the Mount is Marazion, and at the mouth of the stream which forms the western boundary of that town, traces of a very ancient building, apparently used for both smelting and melting tin, have been discovered. In 1849 the stream, having been diverted, flowed westward along the base of the adjoining sand hillock, undermining and washing away large portions. In sections thus made, I saw, at the depth of between three and six yards beneath the surface, the remains of ancient walls, rudely built of unhewn stones, with clay, and near them great quantities of ashes, charcoal, and slag, besides some ancient broken pottery of very rude manufacture, and much brick. In removing a portion of the sand within a few inches of one of the walls, my nephew (Frederic Bernard Edmonds) and myself discovered two fragments of a bronze vessel resting on charcoal, a considerable portion of which had combined with the copper during the lapse of ages, and a beautiful green substance had resulted—the carbonate of copper. The fragments were each about six inches long, four wide, and only the sixteenth of an inch thick, having been apparently parts of the circular top of a vessel three feet in diameter, the mouth being bent back into a horizontal rim three-quarters of an inch broad. No charcoal was on the insides of the fragments, but

[6] Maton's Western Counties (1797), i. p. 205.

their outsides were completely blackened and covered with it.

Professor Hunt, at whose request I presented one of the fragments to the Museum of Economic Geology, kindly analyzed a small portion, the following being the result:—

Weight before analysis, 25 grains.	Grains.
Copper	18·0
Tin	2·25
Iron	1·0
Loss as carbonic acid and oxygen, the copper being partially in the state of carbonate, and much of the tin in oxide	3·0
Earthy matter	0·75
	25

These very ancient ruins, therefore, with the fragments of a bronze furnace, and the abundance of ashes, charcoal and slag, all covered with the sands of many centuries, seem to indicate the very spot where, as Diodorus relates, the tin was cast into cubic forms, previous to its conveyance in carts to the neighbouring island during the recesses of the tide.

The bronze furnace was, I conclude, brought hither by the Phœnicians, for no copper was then raised in Cornwall; and Strabo mentions that the Phœnicians furnished us with earthenware, salt, and copper or bronze utensils (χαλκωματα[7]) in exchange for our tin, lead and hides. We also learn from Cæsar that the copper, or bronze, used by the Britons was imported *(ære utuntur importato)*.[8]

It will be interesting now to inquire for what particular purpose this very ancient bronze furnace was used. It appears from the passage quoted that the tin underwent two distinct fusions,—first, for purification; secondly, for being cast into the form of cubes; and for this latter purpose the bronze furnace may have been used by the merchants after they had purchased the metal, the fire

[7] Geograph. lib. iii. s. 8. See Ezra viii. 27, and Ezekiel xxvii. 13.
[8] De Bello Gallico, lib. v. s. 10.

in this process being applied exclusively to the exterior of the vessel; whereas the method of smelting for purification by the native miners was, according to Pryce, "to dig a hole in the ground, and throw the tin ore on a charcoal fire, which probably was excited by a bellows."[9] Many such rude pits containing smelted tin have been discovered in this district, and are called *Jews' Houses*,[1] there being a tradition that our tin mines were in very remote periods "wrought by the Jews, with pickaxes of holm, box and hartshorn," tools frequently "found amongst the rubble of such works."[2] But as soon as the natives had acquired the art of mining, the Jews may have purchased the smelted metal from them, and, after having cast it into forms most convenient for exportation, conveyed it to the Mount. Here it is worthy of remark that the two different fusions to which the tin was thus subjected in the most ancient times—the one for purification, the other for being cast into particular forms for exportation—are continued to the present day, and not only so, but the different methods of conducting the processes are the same now as they were at first, so far, at least, as that the metal is in contact with the fire in the purifying or smelting process, and not so in the other. Both processes may be seen in operation at Messrs. Bolitho's smelting house and melting house at Chyandour, adjoining Penzance, and the diameter of the *iron* furnace employed in the latter house is very nearly the same as was that of the *bronze* vessel, of which the fragments have been described.

In the preceding paragraph I have assumed, agreeably to the commonly received opinion, that "Jews, as well as Phœnicians, were very ancient traders in Phœnician ships;"[3] and some of them, as far back as the time of Solomon, may have become resident here after the ex-

[9] Mineralogia Cornubiensis, p. 281.

[1] Transactions of the Royal Geological Society of Cornwall, vi. p. 43.

[2] Carew's Survey of Cornwall. Edition by Lord de Dunstanville, p. 26.

[3] Scawen, quoted in Buller's St. Just, p. 5.

ample of the Phœnicians, who are recorded by Thucydides to have "had settlements all round the coast of Sicily," and to have "secured the capes on the sea, and the small circumjacent islands, for the purpose of trafficking with the natives."[4] Indeed, if the Jews who traded here had no resident merchants to purchase and secure the tin, in order to its shipment immediately on the arrival of the Mediterranean ships, great delay and inconvenience would have resulted. Until recently the Cornish tin trade, from the very commencement of its authentic history, has been in the hands of the Jews.

St. Michael's Mount, the supposed residence of the Jewish merchants, was by nature far the strongest of all the numerous fortified places in Cornwall, and therefore a very safe depôt for the metal until the ships came to export it. It was also an exceedingly well sheltered and very accessible sea-port, where vessels might come in and be laden almost any day of the year.[5] From this impregnable fortress the tin merchants appear to have come to the mainland to make their purchases from the natives, as I gather from the passage I have quoted. Now, that part of the mainland nearest the Mount, where in all probability the natives held their tin market, is the spot on which stands the very ancient town of Marazion, all the various names of which record the fact of its having been a market. In *Doomsday Roll* it is called *Tremaras-tol*, "the cell, or hole, market-town;" *tre* being the Cornish for "town;" *maras*, a contraction of *marghas*, "a market;" and *tol*, "a hole, or cell," denoting the religious house on the Mount, to which the town anciently belonged, but which is now included in the chapelry of Marazion. The only name by which it is called in its

[4] Book vi. quoted in Transactions of the Royal Geological Society of Cornwall, iii. p. 120.

[5] These two reasons for conveying the tin to the Mount, for safe custody and for exportation—reasons very obvious to all acquainted with the locality—were not noticed by Diodorus. Had they been taken into consideration by those who formerly denied that the Mount was the ancient Iktin, much inkshed might have been saved.

charter of incorporation, granted in the 37th of Elizabeth, is *Marghasiewe;* whereas, singularly enough, the only name on its ancient and present town seal is *Marghasion.* The name *Marghasiewe* is now never used, having been supplanted by that of *Market-Jew;* and the street in Penzance which leads to Marazion has therefore been always called "Market-Jew Street." Numerous have been the conjectures of antiquaries respecting the origin of the names of this town. Pryce, in his *Vocabulary,* says that "Market-Jew" and "Marazion" signify "the market on the sea-coast;" but, in his *Cornish Grammar,* (the preceding part of the same volume,) I find that *ion* and *iou* are two of the different terminations of Cornish plural nouns; so that *marghas-ion,* and *marghas-iewe,* (which last four letters have nearly the same sound as *iou,*) are merely the different plurals of *marghas,* "a market." The subjoined is an engraving from an impression from its ivory seal, which is probably more than 260 years old. The castle, or priory, with its portcullis down, indicates its connexion with St. Michael's Mount,

Corporation Seal of Marazion.

on which the castle stands. The inscription around it is "SIGILL . MAIORIS . VILLE . ET . BOROV . DE . MARGHASION."[6]

[6] Marazion (considering the Mount as part of it) may be the most ancient town in Britain (See Davies Gilbert's *Cornwall,* ii. p. 215); and my father, its town clerk, appointed in 1805, and now in his eighty-fourth year, may be the senior town clerk in Britain, having been also, for many years, the senior practising solicitor in Cornwall.

The period when Mount's Bay was first visited by the Phœnicians, and ever since which it, or the adjoining bay of Falmouth, has been the chief place in all the world for the export of tin, is supposed to be more than 3,000 years ago;[7] for the tin, so common in Palestine[8] in the time of Moses, was not dug from that land, but imported by the Tyrians from some remote islands known only to themselves, respecting which Herodotus, after acknowledging his ignorance of their situation, says, "it is nevertheless certain that our tin is brought from those extreme regions."[9] These islands are now allowed to be the British islands, of which the only part ever distinguished for its export of tin is Cornwall.

The remains above described of an ancient bronze furnace are not the only supposed Phœnician remains that have been found in this district. A bronze image was discovered in pulling down an old stone wall in St. Just Vicarage in 1832, and presented by the Vicar to the Royal Institution of Cornwall, whose Secretary, Dr. C. Barham, in reply to an elaborate disquisition thereon by Mr. Birch, of the British Museum, has satisfactorily shown that it was probably lost by some Tyrian merchant in the tin district where it was found.[1]

[7] See Dr. Stukeley's Stonehenge, p. 32, and Woodley's Scilly Isles, p. 23, and Mr. John Hawkins, Transactions of the Royal Cornwall Geological Society, iii. pp. 115, 117, 120.

[8] Numbers xxxi. 22. Isaiah i. 25 and 23, i. 7, 8. Ezekiel xxvii. 3, 12.

[9] Beloe's Translation, i. p. 317.

[1] Report of the Royal Institution of Cornwall for 1850, p. 47, in which, as well as in No. 25 of the *Journal of the Archæological Institute*, and in Buller's *St. Just*, p. 6, is a figure of the image.

Mên an tol

Barrow in Scilly

J.H. le Keux. Sc.

by-east from Boscawen-ûn circle, and at long intervals from each other, are three pillars which merit particular notice. The nearest, about 300 yards distant, resembles a wedge with a very blunt or broken edge; it is $7\frac{2}{3}$ feet above ground, and its broadest side, which is nearly 4 feet wide, faces the west by compass. The next of the three pillars is, without exception, the finest and most majestic of all the menhîrs in this district. It is 11 feet high, nearly $6\frac{1}{2}$ wide in its lower part, and $1\frac{1}{2}$ thick; while its sides are almost as flat and smooth as if they had been hewn; the direction of its edge is true north and south, and its sides face east and west. It stands very conspicuously 7 furlongs from the temple, and close on the north side of the Land's End road. The farthest of the three pillars, although only 4 feet above ground, $2\frac{1}{4}$ wide, and $1\frac{1}{4}$ thick, is equally remarkable; for its edge is in the line of the three pillars, north-east-by-east, pointing, like a finger-post, to the temple, and the upper half of each of its two sides bears a Roman cross. The *eastern* cross is, as usual, upright, with its shaft parallel to the vertical edges of the stone; but the *western* cross, unlike every other in this neighbourhood, is inclined very considerably, with its head towards the south. This appears to be the only anciently erected pillar, in this district, on which a cross has been subsequently carved.[6] As it is in a very unfrequented spot, the tourist, after reaching the "Four Lanes' End," at Lower Drift, should walk three hundred paces from the Land's End road along the road to Sancreed Church, then get over the north-eastern hedge, and descend nearly to the bottom of the steep croft in which it stands. These three pillars are all invisible from the temple, and from one another.

III.—The *Tregeseal* temple is on an open common, 3 furlongs south of the top of Carn Kenidjack, in St. Just, and $5\frac{1}{2}$ miles from Penzance. The late Rev. John Buller, taking the smallest distance between the twelve stones now standing as a measure, imagined it to have consisted

[6] A sketch of this stone, with its eastern cross, is given by Mr. Blight in his *Ancient Crosses, &c., in the West of Cornwall*, p. 41.

originally of twenty-one stones; but, in thus judging, he made an error similar to that of Mr. Cotton with respect to the Boscawen-ûn circle; and there is not the least reason for supposing that the number of stones in any of these four druidical temples ever exceeded nineteen, as stated by Borlase, and corroborated by the vulgar name of "nine maidens," (an abbreviation for "nineteen maidens,") by which they are in this district, as already mentioned, everywhere known. Mr. Buller has described the much less perfect remains of another circle west (by compass) from the Tregeseal temple, some of the stones being in a hedge, and the total number having been, as he considered, the same as that of the eastern circle; the circles are 120 feet from each other, measuring from their centres, and the diameter of each "is from 60 to 70 feet."[7] One of these may have been a temple of the sun, and the other a temple of the moon.

Granite slabs from 3 to 6 feet long, each perforated with a hole of about 5 inches bore, have been found near these temples. Four such, including a broken one, are lying on the common, about a quarter of a mile north-east-by-east of the Tregeseal temple; and two may be seen near the Dawns Myin, at the gaps or entrances into fields, one on the north across the great road, the other towards the east. These "holed stones" are supposed to have been used for securing the victims. And Toland, in his *History of the Druids*, speaking of two circular temples in the Orkney Islands, says:—

"Near the lesser temple stand 2 stones . . . . through the middle of which is a large hole to which criminals and victims were tied."[8]—p. 91.

IV.—The temple of *Boskednan* is also on a common, between Ding Dong Mine and Carn Galva, and 3½ miles north-west of Penzance. It has fewer stones remaining than either of the others; and two of them are considerably larger than the rest, one of these being prostrate, and the other, which is next to it, still standing nearly 7

[7] Buller's St. Just (1842), p. 96.
[8] *Ibid.* p. 101. Borlase's Antiq. p. 170.

feet above ground. Near this temple are two or three large barrows, and a small one is within 12 feet on the south of it.

Two furlongs west of these "nine maidens" is the *Mên-an-tol*,[9] which consists of three stones set upright in a straight line east and west by compass. The central one is $3\frac{1}{2}$ feet high, which is an inch or two lower than the others, from each of which it is about $8\frac{1}{2}$ feet apart. This central slab is something like a very large ancient upper millstone, with a hole through it of four times greater diameter than usual. It is rudely convex on its eastern, and nearly flat on its western side. The hole, too, like that in an ancient upper millstone, is considerably larger on the convex, or upper side, than on the opposite, and is nearly circular, with a diameter at the smaller end of about 17 inches. This hole faces each of the outer stones, so that the circumference, or plane, of the slab through which it is bored, is in a line north and south by compass, and also nearly in a line with Lanyon Quoit. For what superstitious purpose this stone was used it is vain to conjecture. The only tradition connected therewith is that persons afflicted with the crick, or rheumatism, who crawl, or are drawn, through it, are cured by this operation. Hence it is called by the neighbouring villagers the "Crick-stone." Having referred to Lanyon Quoit, I may here add that a straight line $1\frac{3}{4}$ miles long, drawn due east and west, would almost intersect *Lanyon cromlech*, *West Lanyon cromlech*, *Ch'ûn Castle*, and *Ch'ûn cromlech;* while another straight line, of the same length, proceeding north-by-east from Lanyon cromlech, would nearly pass through the *Mên-an-tol*, the *Mên Scriffys*, and *Bosprennis cromlech*. These, and the before noticed most remarkable relative positions and bearings of several of our remaining antiquities, show from a new point of view the loss which the antiquarian student has sustained by the destruction, during the last two centuries, of so many of our prehistoric relics.

The four temples now described are not the only ones in

9. "The holed stone," *tol* signifying "hole."—See plate I. fig. 2.

Britain where the number nineteen stands so prominent. In Stonehenge the inner oval, immediately around the altar, consists of precisely nineteen stones.[1] So, too, the temple of Classerniss, in the Isle of Lewis, consists of an avenue of nineteen stones on each side, leading into a circle of twelve others.[2]

In support of the general opinion that these circles were temples of the sun, is the following passage from Diodorus, beginning with an apparent reference to Mount's Bay, the southernmost and mildest part of Great Britain :—

"Amongst them that have written old stories much like fables, Hecatæus and some others say that there is an island in the ocean over against Gaul, (as big as Sicily,) under the arctic pole, where the Hyperboreans inhabit, so called, because they lie beyond the breezes of the north wind; that the soil there is very rich and very fruitful, and the climate temperate, inasmuch as there are two crops in the year."

Here it is important to notice that, with regard to *Britain generally*, this description is not true, but it justly represents the climate of *Mount's Bay*, in this district, from which circumstance we may fairly conclude, that the authorities from whom Hecatæus and the others derived their information, were the Phœnician traders to Mount's Bay, who imagined that all Britain enjoyed as mild a climate as Mount's Bay, where still "there are two crops in the year." But to proceed with the quotation :—

"They say that Latona was born there, and, therefore, that they worship Apollo above all other gods; that these inhabitants demean themselves as if they were Apollo's priests, who has there a stately grove and renowned temple of a round form, that there is a city likewise consecrated to this god." "The sovereignty of this city and the care of the temple (they say) belong to the Boreades, the posterity of Boreas, who hold the principality by descent in a direct line from that ancestor."[3]

The city and temple of Apollo, or the sun, are supposed to have been those of Old Sarum and Stonehenge. "The renowned temple of a round form" of Stonehenge,

[1] See the plate in Dr. Stukeley's Stonehenge, p. 20.
[2] Borlase's Antiq. p. 190.
[3] Book ii. Chap. iii., Booth's Translation, i. p. 139.

according to Dr. Stukeley, must have been built soon after the temple of Solomon, and by British Druids, who had probably heard of that temple through the Phœnician traders. This he inferred from the stones being chiselled, and from some of them being placed horizontally on upright ones, which was an approach to a covered temple. The druidical temples, however, now described, being mere circles of upright stones, unchiselled and unhewn,[4] and having no others placed on them, are apparently older than Stonehenge, and may have been erected by Druids who had come from the East before the Jewish temple was built, and had seen the Jewish tabernacle, the court of which, where the victims were slain, was entirely open to the sky, and enclosed by pillars placed at distances of 5 cubits, or about 9 feet from each other. The court of the tabernacle was, however, rectangular, whereas our druidical temples are nearly circular, a difference that might be traced to the worship of the sun. The druidical priesthood also, like that of the Jews, was confined to the descendants of one man, as recorded in the quotation.

The passage concludes thus:—

"They say, moreover, that Apollo once in nineteen years comes into the island, in which space of time the stars perform their courses, and return to the same point, and therefore the Greeks call the revolution of nineteen years the Great Year."

This mythological reference to the cycle of nineteen years, at the end of which the new and full moons happen within an hour and a half of the same times of the year as they did at the beginning, is very remarkable; for by it Christians have always regulated their moveable festivals, and the Greeks adopted it for the like purpose, after Meton had discovered it in 430 B.C. But it would appear from the sentence last quoted, that the knowledge of this cycle must have been familiar to the Druids in Britain many centuries before the time of Meton, and that to this cycle of nineteen years, the number nineteen so prominent in our druidical temples most probably referred.

[4] Exodus xx. 25.

CHAPTER III.

"Giants' Graves" compared with those in Sardinia and the Scilly Isles.

A FURLONG north-east-by-east of the Tregeseal druidical temple (p. 17) are two very ancient caves, resembling so nearly the numerous "Giants' Graves" in the Scilly Isles, and the still more numerous "Giants' Sepulchres" in Sardinia, that I will here introduce a description of the latter from Tyndale's *Travels* in that island, i. p. 140, published in 1849:—

"They may be described (he says) as a series of large stones placed together without any cement, enclosing a foss or vacuum from 15 to 36 feet long, from 3 to 6 wide, the same in depth, with immense flat stones resting on them as a covering," "The foss runs invariably from north-west to south-east, and at the latter point is a large upright head-stone, averaging from 10 to 15 feet high," "having in many instances an aperture about 18 inches square at its base. On either side of this stile (head-stone) commences a series of separate stones forming an arc, the chord of which varies from 20 to 40 feet, so that the whole figure somewhat resembles the bow and shank of a spur."

The only difference between the caves in Sardinia and those at Scilly is, that the latter are without the tall head stone and arc, do not all point in one direction, and are, or were originally, surrounded each by a circle of large stones, the space between the cave and circle being filled with small stones and earth, and the whole covered with turf. In some instances there is a second circle of large stones concentric with, and 4 or 5 feet distant from, the first. The following is Borlase's description of the largest which he examined in St. Mary's, the chief of the Scilly Isles:—

"In the middle of the barrow was a large cavity full of earth; there was a passage into it at the eastern end 1 foot 8 inches wide,[5] betwixt two stones set on end; the cavity was 4 feet

[5] This is precisely the width of the aperture at the south-east end of the largest Sardinian cave mentioned by Tyndale, ii. p. 282.

8 inches wide in the middle, the length 22 feet; it was walled on each side with masonry and mortar, the walls, or sides, 4 feet 10 inches high. At the western end it had a large flat stone on its edge, which terminated the cavity. Its length bore east-by-north, and it was covered from end to end with large flat stones, several of which we removed, and others had been carried off before for building."[6]

Fig. 3 of plate I. is a drawing of it by Borlase. They are called in Scilly, from their great length, "Giants' Graves." This is now their most common name, but, until the present century, they were generally termed "Giants' Caves," which is indeed the only name given them by Troutbeck, in his *Survey of the Scilly Islands.*

The two caves in this district which I have mentioned are constructed like those in Scilly, and their fosses run from north-north-west to south-south-east. That nearest the Tregeseal temple has still considerable remains of its well constructed granite walls and roof.

Antiquarians are not agreed whether these caves in Sardinia and the Scilly Islands were for the dead or the living. The Sardinian caves are supposed to have been made by Canaanites, who fled from their country in the time of Joshua.[7]

[6] Borlase on the Islands of Scilly, p. 29. See also his Antiquities, p. 207.

[7] Tyndale, i. pp. 145, 147.

CHAPTER IV.

Cromlechs—Derivation of the Name—Sepulchral Monuments—originally buried—Cromlechs of Lanyon, West Lanyon, Ch'ûn, Mulfra, and Bosprennis—Singular Barrow—Zennor Cromlech, the finest in Britain.

Not less ancient than the "Giants' Graves" is the cromlech—a single slab resting either horizontally or obliquely on others set upright, so as to form a *kist-vaen*, or "stone-chest." The common altar tomb seen in almost every church-yard is, as Borlase remarks, but a "diminutive and regular cromlech," the capstone and supporters being now all finely chiselled and squared, and adjusted with mathematical precision, to suit the taste of the present age.

Crobm-lech (as it was formerly written) signifies a *crooked* flat stone. Had it been *crobn-lech* (which in pronunciation differs little or nothing from *crobm-lech*) it would have signified a *round* flat stone, and have been synonymous with *quoit*, the name by which these erections are here, and in some parts of Wales, most commonly known.[8] That in France, near Poitiers, is termed simply *pierre levée*, "the raised stone." Thus in each country the entire monument derives its name from the form or position of the incumbent slab.

Cromlechs are decidedly sepulchral structures, and all in this neighbourhood seem to have been once buried within barrows, the inclined planes of which (as observed by Borlase) might have been instrumental in the placing of the huge slabs on their supporters.

Borlase notices a small one found near the Land's End, in 1716, containing "an urn full of black earth, and round the urn very large human bones, not placed in their natural order, but irregularly mixed." "A farmer,"

[8] Nicholson's Cambrian Guide, Third Edition, pp. 90, 356. *Crobm* and *crobn* are probably mere different spellings of the same word, signifying "round" as well as "crooked;" indeed, the word "round," in some instances, is synonymous with "crooked."

the same height, and about 9 feet wide. The east supporter was 10½ feet wide, and, with the other two, formed almost a triangular kist-vaen, with a space of about a foot at the north end unenclosed. The east and west supporters have since been cleft and carried away. In digging under it was "found a broken urn with ashes, half a scull, the thigh bones and most of the other bones of a human body." These, it is added, were "lying in such a manner as fully proved that the grave had been opened before;"[3] but if they were merely "irregularly mixed," as in the cromlech of Mên, which I have first noticed, this would be no proof of the grave having been opened before.

III.—The most perfect of all our cromlechs is that of Ch'ûn, very nearly 5 miles west-north-west of Penzance, and 500 yards west of *Ch'ûn Castle;* the *castle* being partly in Madron, and partly in Morvah; the *cromlech* partly in St. Just, and partly in Morvah. The top stone it 12¾ feet long, 11½ wide, and 35¾ in circumference. The two side supporters are each about 8 feet in length, and, with the two end stones, form "a pretty regular kist-vaen," which, in Borlase's time, had a "low barrow, or heap of stones round it," much of which still remains; so that the supporters, although between 5 and 6 feet high, rise only four feet above the barrow. A correct sketch of this is fig. 1 of plate II.

Lanyon Quoit, West Lanyon Quoit, Ch'ûn Castle, and Ch'ûn Quoit, are all in the same straight line, due east and west.

IV.—The cromlech on the top of *Mulfra* Hill, in Madron,[4] is 3½ miles north-north-west of Penzance. The

[3] Archæologia, xiv. Cotton's Celtic Remains, p. 37. In 1805 a monument of this kind was discovered by Mr. Fenton in Flintshire, also buried within a tumulus, and near a small field containing many kist-vaens; the incumbent slab was nearly 9 feet long, covering a kist-vaen 4½ feet long, 2⅓ broad, and 2 deep, which enclosed a fine dry mould. A small stone hatchet was also found.—Nicholson's *Cambrian Guide*, p. 265.

[4] Although Mulfra Hill is part of Madron, it is detached from the rest of that parish by an intervening portion of Gulval.

cover-stone, according to Borlase, was 9⅔ feet by 14¼, including a piece evidently broken off, and lying near it. Its present circumference scarcely exceeds that of Ch'ûn. The kist-vaen is 6⅔ feet long, and 4 wide; the three slabs forming the two ends, and one of the sides, are about 5 feet high; the south supporter is gone, and on that side the cover stone has fallen, so as to rest on the ground at an angle of about 45 degrees. In this state, with the fragment close by, it was described by Borlase in 1754; the displacement must, therefore, have occurred prior to his description, and I am informed that it took place during the terrific thunderstorm there in 1752. At that period a barrow surrounded it, about 2 feet high, and 37 in diameter, of which at present little or nothing remains. On the same hill, a little to the north of the cromlech, are the remains of four or five barrows.

V.—There is a small dismounted cromlech 4½ miles north-west-by-north of Penzance, in the parish of Zennor, nearly two furlongs from the village of Bosprennis, and near the west side of the path leading from that village to Bosigran. The kist-vaen is about 4 feet high, 3 wide, and 5 long. The capstone is nearly circular, 5 feet in diameter, and about 6 inches thick. The slab which forms its south-western side is 6 feet long; the supporter on the opposite side is gone, and on that side the cover stone lies on the ground. The north-west end consists of a single stone, the south-east end of two. Around it is a heap of earth and stones, the remains, doubtless, of a barrow which once covered it.

Between this small quoit and the large one next to be described was another of considerable size, in the estate of Trewey, but not a vestige of it now remains. It stood about a furlong south-east of Gundry Cave, a remarkable barrow, 100 feet in circumference, raised on a small natural carn, or heap of rocks, on an eminence nearly 5 furlongs south-east-by-south of Zennor Church, and about 2 furlongs from the east side of the road to Penzance. This barrow (like that in Wales, presently to be mentioned) "is depressed at the centre in the form of a

bowl." At the bottom of this hollow (as I was informed by the late aged tenant of Trewey) was a cromlech, or horizontal slab, 6 or 8 feet square, supported by others set upright, all which have since been removed. This singular barrow, therefore, (like the large one at Plas Newydd, described in Nicholson's *Cambrian Guide*, p. 155, with a cromlech at the bottom of its hollow,) was originally, I imagine, merely a heap covering a cromlech, and the depression in the centre a modern excavation to ascertain the contents of the barrow.

VI.—The great and celebrated cromlech of Zennor (plate II. fig. 3) lies in a croft on a very elevated plain, and nearly half a mile east of Zennor Church. Although its distance from Penzance is scarcely more than 5 miles (north-by-west), its locality is so unfrequented that few persons seem aware of its existence. Mr. Cotton, in his *Celtic Remains*, printed in 1827, actually states (p. 36) that it was "totally destroyed;" but the destroyed cromlech which he heard of was probably that in Trewey, already noticed. The kist-vaen is about $6\frac{1}{2}$ feet long, $4\frac{1}{2}$ wide, and from 8 to 9 feet high; the supporters on the north and south sides, and at the east end, being 9 feet, that at the west end only 8 feet high. The single slab, which forms the south supporter, is $11\frac{1}{2}$ feet long. This, and the two slabs on the north side, run on beyond that of the east end, until they come almost into contact with two other large slabs, (each nearly 11 feet long,) placed at right angles with them, thus forming a second kist-vaen, 5 feet long from north to south, 2 from east to west, and 9 feet high. Into this second kist-vaen is an entrance, 2 feet wide, between its two eastern slabs. The cover-stone of the two kist-vaens measures 18 feet in length, 11 in breadth, and 48 in circumference; its average thickness being about 1 foot. At present, however, the cap-stone rests with its west end on the ground, the supporter at that end having been broken into two parts, neither of which bears any mark of a tool. In Borlase's time the heap of stones, 14 yards in diameter, beneath which this cromlech was buried, "almost reached

the edge of the quoit," or horizontal slab, when resting on its supporters.[5]

A cromlech covering so large an area, and so elevated, is not, perhaps, to be found elsewhere in Europe. It surpasses Pentre Evan in Pembrokeshire, which Sir Richard Hoare thought superior in size and height to all the other cromlechs in Wales.[6] It is also one foot higher, and considerably larger, than the "stupendous monument" in Kent, between Rochester and Maidstone, called "Kit's Cote," a corruption possibly of "Quoit's Quoit," the quoit of quoits.[7]

[5] Antiq. p. 218.

[6] The top stone of Pentre Evan cromlech is 18 feet long, and 9 broad, resting on two supporters of columnar form, the one above 8, the other above 7 feet high, with an intermediate one that does not quite reach the south end. "It is encircled by rude stones 150 feet in circumference."—Nicholson's *Cambrian Guide*, pp. 477–479.

Another Welsh cromlech near Haverfordwest, now fallen, was larger than that of Pentre Evan, the cap-stone being 16½ by 13½ feet, and from 4 to above 5 feet thick. It also was "in the centre of a circle of upright stones."—*Ibid.* p. 285.

The largest cromlech in Wales is that between Cowbridge and Cardiff; its horizontal slab being 24 feet long, 17 in its greatest breadth, and from 2 to 2½ thick. The north supporter is 16 feet long, the west 9 feet. At the east extremity are three stones set closely together; the south side is open. The height at the east end is 6 feet, at the west 4½.—*Ibid.* p. 225.

Arthur's Quoit in Anglesey rests on several supporters, measures 17½ by 15 feet, and is nearly 4 feet thick, but it is raised only 2 feet above the ground.—*Ibid.* p. 356.

In France, near Poitiers, the *pierre levée*, which has five supporters, is 50 feet in circumference.—Rees' *Cyclopædia*.

[7] Some derive "Kit's Cote" from the name of a shepherd, who is said to have lived in it; others from that of a British deity.—*Gentleman's Magazine*, 1763, p. 248; and 1824, pp. 125, 400.

CHAPTER V.

Sepulchral Urns and Barrows.—Boleit Urn, 20 inches high—Ancient Mode of Burning the Dead—Trevello very handsome Urn, and Kerris Vean Bowl, similar to others found elsewhere—Tresvennack Urn, the largest extant—Botrea Urn and Barrows—Trannack Urns—Funerals most numerous on Sundays.

THE relics represented in plate III. were all found in this district, and may be seen in the Museum of the Penzance Natural History and Antiquarian Society. Fig. 3 is a very handsome urn; and fig. 6 is not only of a remarkable character, but appears to be the largest sepulchral urn extant in Cornwall; and Mr. Doubleday informed me, in 1853, that there was none so large in the British Museum.

Fig. 1.—The urn, to which this cleat belonged, was found in a large barrow, opened in 1847, in the estate of Boleit,[8] (Boleigh), 4 miles south-west-by-south of Penzance. It was about 20 inches high and 16 wide, but only two fragments were preserved. These, with cleats attached, and marked with zigzags of double lines, I obtained from the farmer who opened the barrow. Whether the urn had four cleats like fig. 3, or only two, I could not ascertain. The cleats are of much purer clay than the fragments; the latter being of a black material mixed with gravel, and coated inside and outside with an unctuous matter, which I observed likewise on some of the stones taken from the heap. A large muller and a small one *(fig.* 2) were found in the same barrow, together with a granite slab having a smooth concavity in its upper surface, as if it had been used for bruising corn with a globular stone. The heap of stones which formed the barrow has been since built up into a high circular wall around its site.

From the locality, and from the absence of all coins, metallic substances and inscriptions, this was probably the tomb of some distinguished Briton, who died before

[8] *Bo-leit* signifies "the dairy or milk cot."

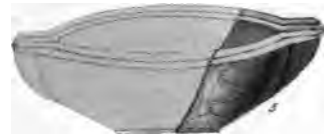
Scale of 12 Inches

9

Truen

6

Tresvennack



5

Kerris vean

7

8

Trannack

2

Boleit

1

4

Trevello

3

Sepulchral Urns. Millstones &c. found near Penzance.

Drawn by F.B.Edmonds

J.H.Le Keux sc.

with their mouths downwards. Two or three other urns were found under the same tumulus, and the natural floor on which they all rested was strewn with ashes and bits of charcoal. Under the same heap was a smoothly rounded piece of granite, whose greatest diameter was $4\frac{1}{2}$ inches, and its least $3\frac{1}{4}$, through the middle of which was a small hole; the thickness in the centre was $\frac{1}{4}$ inch, diminishing gradually towards the circumference.

Unlike any of the urns in the preceding plate was that found in 1826, in a large barrow on the top of Botrea Hill (Trannack Downs), in Sancreed, $4\frac{1}{4}$ miles west-by-north of Penzance. It was about 12 inches in diameter, and "of a cylindrical figure, relieved towards the upper margin by a slight increase of thickness, without any ornament except a few indented strokes, and of very coarse manufacture." It contained black earth, apparently "saturated with fat or animal matter, and plentifully mixed with ashes and charred wood." It was found "standing upright on the large piece of granite which formed the bottom of" a cavity, ($3\frac{1}{2}$ feet long by 2 feet wide,) walled with flat stones, and covered with a slab.[4] The barrow, or circular area which contained this cavity, is slightly elevated above the general level of the hill, and is about 100 feet in diameter. This and three other similar circles have their centres all in the same straight line north and south, extending about 1200 feet;[5] the largest of these (which contained the urn) being the third reckoning from the north, the two outer ones being much smaller than the two inner ones. In the second circle were the remains of a kist-vaen, enclosing a dark mould, and two flint arrow-heads barbed and sharp pointed. On the same hill, south-east of the southernmost barrow, are

[4] Dr. Barham, Transactions of the Royal Geological Society of Cornwall, iii. p. 192. See also Cotton's Celtic Remains in the West of Cornwall, pp. 39–42.

[5] The raised edge of the northernmost circle cannot now be traced, but it appears to have been a barrow like the others, from its striking contrast with the surrounding croft, the latter being very barren, whilst this circular area, like the other three barrows in the same line, is covered with luxuriant vegetation.

others of considerable height, one being still 10 or 12 feet above the natural level of the ground. There were three other very large barrows in a straight line north-west and south-east, with intervals of about a furlong each, on Lady Downs, 4 miles north of Penzance. Two of them have been entirely removed for buildings within the last thirty years; but much of the central one still remains, which, ten years ago, was 80 feet in diameter, and must have been originally at its centre 5 or 6 yards high.

The barrows destroyed near Penzance, in agricultural improvements, and for buildings, are very numerous; but a great many still remain on our waste lands.

As a barrow often contains several urns, or kist-vaens, on the same floor, without any appearance of distinct periods of interment, our heathen ancestors (like the labouring classes of our country parishes in the present day) may have buried their dead almost exclusively on Sunday, the corpses of all who had died during the week having been brought from the surrounding district, and laid on one common pyre, at such distances from each other, that after the flames had ceased, the ashes and unconsumed bones of the different bodies might have been readily collected by their respective friends, and deposited within and around urns, or within kist-vaens without urns, previously to the whole being covered with the common heap.

CHAPTER VI.

Hill Castles and Cliff Castles—Walled Towns—Ch'ûn Castle—Castle-an-Dinas—Trecrobn Castle—Caërbrân Castle—Bartinney Castle—Castle Horneck—Castle Lescudjack—Kerris Roundago—Truen Round, Millstones, &c.—Carn Yorth Circles—Cliff Castles of Treryn, Maen, Kenidjack, and Bosigran—Giants' Castle in Scilly.

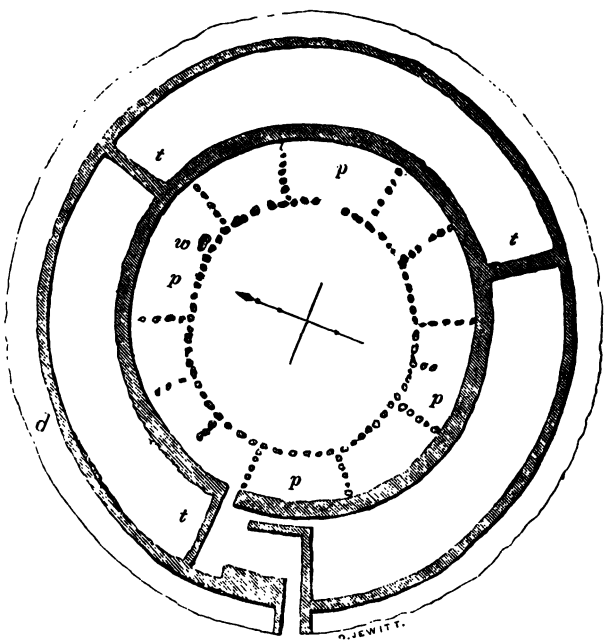
THE "hill castles" and "cliff castles," whose ruins still remain on so many of our hill-tops and projecting cliffs, were probably the walled towns of the original inhabitants, who may have erected them from designs furnished by their Phœnician friends, in whose country were cities which the Jews said were walled up to heaven.—(*Deut.* i. 28.) Cæsar observes:—

"Oppidum autem Britanni vocant, quum sylvas impeditas vallo atque fossâ munierunt quò, incursionis hostium vitandæ causâ, convenire consueverunt."—*De Bello Gall.* v. 17.

The most perfect of our *hill castles* (which are all circular, or nearly so) is that of Ch'ûn,[6] on a very commanding hill $4\frac{3}{4}$ miles west-north-west from Penzance. It consists of two concentric stone walls, with a space of 30 feet between them. The inner one, which is about 12 feet thick, Borlase considered to have been 15 feet high, and the less massive outer one 10 feet high, the remains in his time being much higher than at present. The walls are uncemented, and of Cyclopean structure. Within the inner wall, and concentric with it, at the distance of 30 feet, are the remains of "a circular line of stone work," with ten or more straight lines, or partitions, of similar stone work connecting it with the inner wall, forming, apparently, so many penthouses, in which the inhabitants or their cattle were sheltered. The open area in the centre of all is "125 feet from east to west, and 110 feet from north to south."[7]

[6] *Ch'un*, or *Chy-an-Woon*, signifies a house on the down or common.
[7] Borlase's Antiq. p. 316.

Within one of the supposed penthouses is a well, with steps descending to the water. The entrance through the inner wall is from the west, facing Ch'ûn Quoit; a few yards southward from this entrance is the entrance through the outer wall. Both gateways were evidently very



Plan of Ch'ûn Castle.

d, ditch; *ttt*, three traverse walls between the two great walls; *pppp*, penthouses; *w*, well.

strongly fortified, and in their narrowest parts were only 6 feet wide. Adjoining the northern side of the inner gateway a stone wall traverses the space between the two great walls, and two other such traverse walls were standing in Borlase's time, the three traverses being one-third of the circle distant from each other. Besides these, there was a fourth traverse (which still remains) proceeding from the south side of the outer gateway towards the inner wall, until within three feet of it, and

then turning at right angles towards the first mentioned traverse. A ditch surrounds the outer wall, across which is a bridge or causeway leading into the outer gateway. The accompanying sketch from Borlase represents the castle as it stood a century ago.

Let us now compare this castle with one of the ordinary dwellings in Palestine, from which its design may have proceeded. Each consists of an area exposed to the sky, surrounded by penthouses, or piazzas, opening into it. Each also has two walls parallel with each other, against the inner of which these penthouses are erected; but whilst in the eastern houses the space between the two parallel walls is roofed in and divided into apartments for the servants, that in Ch'ûn Castle is at present without any roof or apartments. In the central court, or in "the midst" of a house of this description, our Saviour is supposed to have been teaching when the paralytic man (*Luke* v. 19) was let down "with his couch into *the midst* before Jesus," the bearers having ascended by the ordinary staircase to the "house-top," or the flat terrace roof uniting the two walls (*Neh.* viii. 16), and from thence gently lowered him down along the sloping tiling of the penthouses, or piazzas, into the court. This court had frequently an awning, or temporary covering, over it during the heat of the day, and the unfastening and removing of that part of it, immediately over where Jesus was, is considered to be all that is meant by the words "broken it up" in *Mark* ii. 4.

Castle-an-Dinas,[8] in Ludgvan, 3 miles north-by-east of Penzance, like that of Ch'ûn, consisted originally of two very thick concentric uncemented stone walls, with an annular space of about 30 feet between them. The outer wall is more than 12 feet thick, and though now only 5 feet high, was probably double that height. Of the inner wall nothing now remains but its foundations, which are about 12 feet thick, and enclose an area about 180 feet in diameter, which is nearly the average diameter of

[8] *An-Dinas*, signifies "the fortress," or "the walled town."

the area enclosed by the inner of the two great walls of Castle Ch'ûn. The two great walls of Castle-an-Dinas, however, (unlike those of Ch'ûn,) were surrounded, at the distance of 40 or 50 feet, by an external vallum of earth and stones; and exterior to all these is another strong wall towards the west, reaching nearly half round the castle. In Borlase's time there were many circular enclosures within the central area, each about 7 yards in diameter, formed by walls only two or three feet high. A Gothic tower has been erected here by the late Mr. Rogers, the grandfather of the present proprietor. The hill commands a fine view of Mount's Bay and St. Ive's Bay, and from it twenty-four parish churches are said to be visible.[9] Borlase calls this the highest hill in the hundred of Penwith, but it is only 735 feet high, whereas the height of Merra Hill, 2 miles north of it, is 805 feet.

Trecrobn[1] (Trecrobben) *Castle*, in Lelant, 4½ miles north-east-by-north from Penzance, consists of a single wall (with gateways) of large stones and earth, enclosing the hill-top.

Caërbrân[2] *Castle*, in Sancreed, 4 miles west-by-south of Penzance, had a stone wall at least 12 feet thick, enclosing an area of about 70 yards in diameter, and surrounded by two ditches, with an intervening earthen mound still in some places 15 feet high. The two ditches and the mound are together about 20 yards in breadth. The stone wall is no longer standing; but its former vast breadth and height were, until the last few years, fully indicated by its foundations and extensive ruins, which have since been removed for buildings. In the centre of the fortress are the remains of a round stone building, probably the citadel.

Bartinney[3] *Castle*, three-quarters of a mile west of it, does not appear to have been of great strength. But it is worth visiting, on account of the hill whereon it stands

[9] Drew's Corn. ii. p. 430.

[1] *Trecrobn* is "the round town."

[2] *Caër* is a "city," or "walled town;" *brân*, a "crow;" *brên*, a "tree."

[3] *Bar* is "the summit."

being the highest in that neighbourhood, and 689 feet above the sea.

Castle Horneck,[4] or Lezingy Round, on the hill-top, a mile west of Penzance, is an enclosure formed by a broad and high annular mound of earth, still in good preservation; the space, including the mound, is about an acre and a quarter, and is now planted with firs. But the much larger enclosure of *Castle Lescudjack*, immediately over the eastern entrance of Penzance, which Hals described as a "notable treble intrenchment of earth after the British manner," has, from agricultural improvements, almost disappeared.[5]

There are other buildings on hill-tops here not called castles. One of these, already referred to (p. 288), is the large "Roundago," $2\frac{1}{2}$ miles south-west of Penzance, adjoining a small meeting-house a furlong north-east of the village of Kerris.

A "round," about 125 feet in diameter, encloses the top of the eminence immediately above the village of Truen, in Madron, and 3 miles west-north-west of Penzance. Near its centre a circular pavement of broad unhewn granite slabs, with small stones in the interstices, and about 10 feet in diameter, was discovered in 1845, immediately beneath the turf; and, a few feet from it, also beneath the turf, lay the upper and nether stones of a hand-mill.[6] The upper stone is convex in its upper surface, and hollow beneath, the hollow being of a conical form. The nether stone has a corresponding conical form, with a cavity on the top of it an inch and a half deep, wherein the spindle must have been fixed, round which the upper stone was turned. Through the centre of the

[4] *Horneck* is "iron."

[5] Two very remarkable circular earthworks (Castle Cayle), 9 miles north-east of Penzance, and close on the north-east side of the great road from Hayle to Fraddam, are so near to one another, that the ditch surrounding the one unites with that surrounding the other. This double castle, though not on a hill-top, stands on very elevated table land, and some of the remains are still several yards high.

[6] These I have deposited in the Museum of the Penzance Natural History and Antiquarian Society.

upper stone was a tapering hole, 4 inches wide above, and only 2 inches below, which must have received the spindle, and have been also the channel by which the corn was poured into the space between the two stones. As the hollow cone of the upper stone makes rather a larger angle with the horizon than does the solid cone of the nether stone, their grinding power is greatest near their lower edges, where they come into contact. Each stone is 13 inches in diameter, and 4 inches thick. As the place of the handle was broken off, the form of the upper mill-stone, in plate III. fig. 9, is taken from another now in my possession, which is the only perfect one I have seen, and which was found some years ago near the Tregeseal druidical temple. Mills resembling this have been discovered at Pompeii.[7] A large muller was also found near the mill-stones, 2 feet in diameter, and 9 inches high.

I have visited other circular works crowning hills in this district, and bearing evident marks of having been the walls of very ancient towns. Their descriptions, however, do not differ materially from some of those already mentioned.

Contemporaneous to all appearance with the *hill castles*, and constructed as much like them as the difference of situation allowed, are our *cliff castles*, consisting of points, or tongues of land, fortified by inaccessible cliffs towards the sea, and by thick stone walls, mounds and ditches towards the land. The largest of these has been seen by all who have visited the celebrated Logan Rock (nearly 7 miles south-west of Penzance). In walking thither by the path through the fields from the village of Treryn[8] (Treen), the first striking object towards the south that presents itself on reaching the open common, is an ancient entrance through a broad and lofty vallum, with a ditch on its external or northern side, extending east and west

[7] Family Library, Pompeii, ii. p. 138.
[8] *Tre* is "town;" *rhyn*, "promontory."

to the edges of two fearful precipices, the vallum being highest where most accessible from the land. Passing through this opening towards the Logan Rock, we arrive first at some very low vallums, and then at a stone wall 12 feet thick, extending eastward and westward considerable distances to protect the castle wherever it had not been sufficiently fortified by nature. 200 yards further towards the south, down a steep declivity, and beyond a narrow isthmus, having precipices on each side and remains of other fortifications, is an ancient stone wall with a gateway. The extensive headland projecting from this isthmus, and consisting of enormous piles of rocks, upon one of which the Logan Rock is poised, was no doubt the citadel. The distance from it to the northern termination of the fortifications of the castle is about 300 yards, so that the castle afforded ample room for the dwellings of a considerable population, independently of the citadel, which must have accommodated a great number more.

Maen[9] *Castle*, about half a mile north-east of the Land's End, and 8 miles west-south-west of Penzance, has a large vallum, and a massive wall of rocks, with an intervening deep ditch; the wall, ditch and vallum being most perfect on the north side of its once well fortified gateway. Adjoining this cliff castle are remains of numerous ancient enclosures, used probably for pasture or agriculture.

Half a mile north-north-east of Cape Cornwall, and 7½ miles west-by-north of Penzance, is another cliff castle, that of *Kenidjack*, adjoining which, likewise, are traces of numerous ancient enclosures.

Four or five miles further on along the northern coast, and 5½ miles north-west of Penzance, is *Bosigran*[1] *Castle*, within which is a flat logan rock, containing rock basins,

[9] *Maen* is a "stone;" the name is sometimes spelt *mean*, which, however, is pronounced in Cornwall as if it had been written *maen*.

[1] *Bos* is a "dwelling."

and measuring several yards in circumference. Of each of these cliff castles the remains are very considerable.[2]

Gurnard's Head, or *Treryn Dinas*, nearly 6 miles north-west-by-north from Penzance, was also most probably an ancient cliff castle, the name, *Treryn Dinas*, being identical with that of St. Levan cliff castle on the southern coast, which was first described.

The dismantled appearance of our granite walled castles has evidently resulted from the removal of their choicest stones for modern buildings, although Borlase, under the impression that they were of Danish origin, imagined they were dismantled for the purpose of rendering them useless.

The remains noticed in this chapter are those of walled towns. The villages and private dwellings will be the subject of the next.

[2] In the cliff castle called the *Giant's Castle*, in St. Mary's, one of the Scilly Isles, the stone wall is very thick, and the approach protected by two low vallums of earth, and two ditches. The projecting cliff, thus fortified, is crowned by some enormous horizontal slabs, which overhang considerably a most frightful precipice, and upon which every visitor stands to view the sublime scenery below and around.

CHAPTER VII.

Ancient British Villages—Churches and Dwelling-Houses, what originally—British Huts—British Villages—Old Bossullow—Higher Bodennar Cave—Boleit Cave—Higher Bodennar Crellâs—Old Chyoster and its Cave—Remarkable Cave at Chapel Euny—Carn Yorth Circles—Conclusion.

ALTHOUGH the words *pro aris et focis* are so commonly used to express attachment to our churches and homes—the *altar* being the chief part of the former, and the *fire-place* of the latter—it has never, perhaps, occurred to my readers that, as a church was at first simply an altar surrounded by a wall, and covered with a roof; so a dwelling-house may have been originally nothing but a fire-place similarly enclosed. Afterwards a kitchen was constructed, the fire-place being at one end, as far from the door as possible. As civilization advanced, bedrooms and parlours were added. Most of the rural habitations of this district, sixty years since, might have suggested this idea; and, in many of our farm-houses and cottages at the present day, the fire-place at one end of the kitchen is the bare *earth*, (or "hearth" as it is now called,) 5 or 6 feet square, in the centre of which the fire is kindled, so that the inmates may stand or sit literally *around* it.

The *detached huts* of the Britons seem to have been generally mere oval or circular excavations, 3 or 4 feet deep, and 8 or 10 feet in diameter, edged with low walls of earth, or stones, upon which was raised a conical roof of poles, or branches of trees, covered with reed or turf. Remains of what appear to have been such huts are still to be seen in this district. But when granite slabs 3 or 4 feet long were at hand, they were set upright in a circular form on the unexcavated ground, to serve as walls for the huts. I have elsewhere[3] described some of the

[3] Reports of the Penzance Natural History and Antiquarian Society for 1848 and 1849, pp. 246, 346.

latter kind of huts which I observed close to large ancient residences at Truen and Carn Kenidjack.

In this district also are remains of some of the *villages* of the ancient inhabitants. Thus $4\frac{1}{2}$ miles north-west-by-west of Penzance, and about two furlongs north-east-by-east of Ch'ûn Castle, are the remains of "Old Bossullow," which, although referred to in some histories of Cornwall, were never described until 1849. "On this spot," says Miss Matilda Millett, in the *Transactions* for that year of the Penzance Natural History and Antiquarian Society, p. 286, "may be traced the ruins of upwards of 30 enclosures, of a rude circular form, varying from 8 to 40 feet in diameter: some of the larger ones appear to have been originally divided and subdivided: the walls or hedges are composed of unhewn stones without cement, and vary in elevation from 5 feet to mere foundations. Not a vestige of iron or metal is to be found, nor the mark of any tool; there are no windows nor chimneys, and the entrances, where most perfect, are very narrow, averaging but 2 feet and a half." From the centre of one of these huts, earth and stones to the depth of one foot were removed, and beneath was found "a thin layer of unctuous black mould, in which was a small quantity of charred wood," (the stems of the furze or whins, *ulex Europæus*, which has always been the most common fuel here,) "a great number of burnt stones, and as many fragments of pottery as filled a small basin." In an adjoining hut, "a foot below the surface, some flat stones appeared to have been placed on the clay, forming a sort of rude pavement." To this account I will only add that many of these huts seem to have been built around a common central area. One such area, or enclosure, I particularly noticed, with a strong and well preserved entrance into it, 8 feet wide, facing the south-south-east. A well preserved and strongly made entrance into a second large enclosure is about 5 feet wide, and also faces the south-south-east. Of similar enclosures I shall have presently to speak.

Borlase notices the remains of another supposed British village in Sancreed, called the "Crellâs," 4 miles west-north-west of Penzance. Its site is immediately above the small village of Higher Bodinnar, or Bodennar, as it is vulgarly called.

"In the southern part of this plot," says that author,[4] "you may with some difficulty enter a hole faced on each side with a stone wall, and covered with flat stones. Great part of the walls, as well as covering, are fallen into the cave, which does not run in a straight line, but turns to the left hand at a small distance from the place where I entered, and seems to have branched itself out much farther than I could then trace it, which did not exceed 20 feet. It is about five feet high, and as much in width; called *the Giants' Holt.*"

Borlase imagined this cave (which is now completely destroyed) to have been a private way into the supposed British town or village; but it seems more probable that the cave itself was one of the dwellings. Within an adjoining enclosure, as ancient perhaps as the village itself, my nephew when with me found, in a mole heap, a fragment of the upper part of a vessel of coarse dark pottery, the diameter of the vessel (judging from the fragment) having been about 12 inches. The top, which is much thicker than the rest, has a flat brim projecting horizontally over the outside: it is without ornament, and has no glazing; but the outside is partially coated with a black polish, proceeding apparently from the pulverizing of some particles of its substance, by the friction of a rope used for its conveyance.[5] This discovery of ancient pottery, on what Borlase regarded as the site of a British town, tends to confirm the conjecture of the learned antiquarian.

A cave still perfect, similar to that described by Borlase, is on an eminence in the tenement of Boleit (Boleigh), in St. Buryan, and about a furlong south-west of the

[4] Antiquities, p. 273.

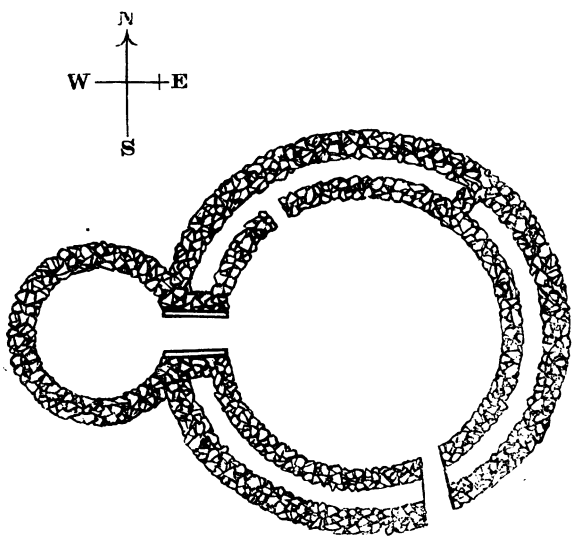
[5] The fragment is now in the Museum of the Penzance Natural History and Antiquarian Society.

village of Trewoofe (Trove). It is called the "Fowgow," and consists of a trench 6 feet deep and 36 long, faced on each side with unhewn and uncemented stones, across which, to serve as a roof, long stone posts, or slabs, are laid, covered with thick turf, planted with furze. The breadth of the cave is about 5 feet. On its north-west side, near the south-west end, a narrow passage leads into a branch cave of considerable extent, constructed in the same manner. At the south-west end is an entrance by a descending path; but this, as well as the cave itself, is so well concealed by the furze, that the whole looks like an ordinary furze brake without any way into it. The direction of the line of this cave is about north-east and south-west, which line, if continued towards the south-west, would pass close to the two ancient pillars called the Pipers, and the Druidical temple of *Dawns Myin*, all within a half of a mile. Borlase, who noticed this cave, gives a full description of another ancient cave close to Pendeen House, in St. Just,[6] and says that many other caves of descriptions not very different from the preceding were "to be seen in these parts" in his time, and some had been destroyed by converting the stones to other uses.

The ancient dwelling-place next to be described may have been the most *northern* part of the British village at Higher Bodennar, called the Crellâs, referred to by Borlase, and if so, it may be a fair specimen of what the rest of the village now destroyed had been; for the cave which he saw at the *southern* end of the village, as already described, was evidently of a very different character from the buildings of which it chiefly consisted. This dwelling-place, of which a ground-plan is given below, consists of two circular or oval enclosures, formed by very thick, low walls, covered with furze. The smaller enclosure, extending internally 21 feet from north to south, has no opening except into the larger. Inside, and concentric with the larger wall, is another wall, with an

[6] Antiquities, p. 274.

intervening ditch from 4 to 5 feet wide. This ditch, when roofed and divided into apartments (by traverse walls), may have been an habitation for a large family, while the grass plot in the centre (about 40 feet from north to south, and 36 from east to west) may have served for the recreation of its occupants, when not required for their cattle. One of the traverse walls, dividing the



Ancient Dwelling at the Crellâs.

space between the two concentric walls into apartments, may still be seen, 4 feet thick, and in good preservation, opposite the only entrance from the external grounds. Other traverse walls may have been at the sides of this entrance, which is about 6 feet wide, faces south-south-east, and is nearly at the bottom of the lower or larger enclosure. This entrance leads straight through the outer and inner walls. Borlase speaks of a similar passage through *both* walls on the northern side also, but there is no opening in that direction, except through the inner wall into the space between it and the outer wall. There were probably other similar entrances into the spaces

between the two walls, but now too ruinous to be distinguished. The descent from the small enclosure on the west, into the double walled green area on the east, is by a passage, 6 feet wide, leading between two large slabs, still standing more than 4½ feet above ground, with their edges east and west. This higher enclosure, and the space between the two walls of the lower one, would, when roofed with branches of trees, and covered with turf and furze, have formed an excellent hiding-place, as well as a dry and well sheltered habitation. The upper enclosure might have been occupied by the proprietor's own family, and the roofed ditch, between the two walls of the lower enclosure, by his servants. Above and adjoining the higher enclosure is a large green terrace, used probably for recreation, or as a fold for cattle. The name *Crellâs*, by which these remains, or the site on which they stand, are called, is evidently a corruption of *Cryglâs*, by the common practice of rendering the *g* mute as in the Italian, of which we have an example in *Marghasion* being always called *Marazion*. Now *Cryglâs* is the name by which the remains of a neighbouring ancient village at Truen[7] are called, and signifies "a green hillock, or barrow," which would have been the appearance of these ruins at a distance, by reason of the furze, broom, or other evergreens, with which they were concealed. Borlase considered these circles a place of council, the upper and smaller one being exclusively for the king and his nobles.[8] But I have always regarded them as an ancient British dwelling-place, although, when I first described them in 1848,[9] I was unaware of any similar remains in this neighbourhood. Last year, however, I saw for the first time the remains of an ancient British village, with dwellings constructed upon a very similar plan, as will appear from the following description.

Exactly 3 miles north of Penzance, and a quarter of a

[7] *Truen*, or rather *Tre wen*, is the Cornish for the "fair town."

[8] Antiquities, p. 194.

[9] Transactions of Penzance Natural History and Antiquarian Society, p. 248.

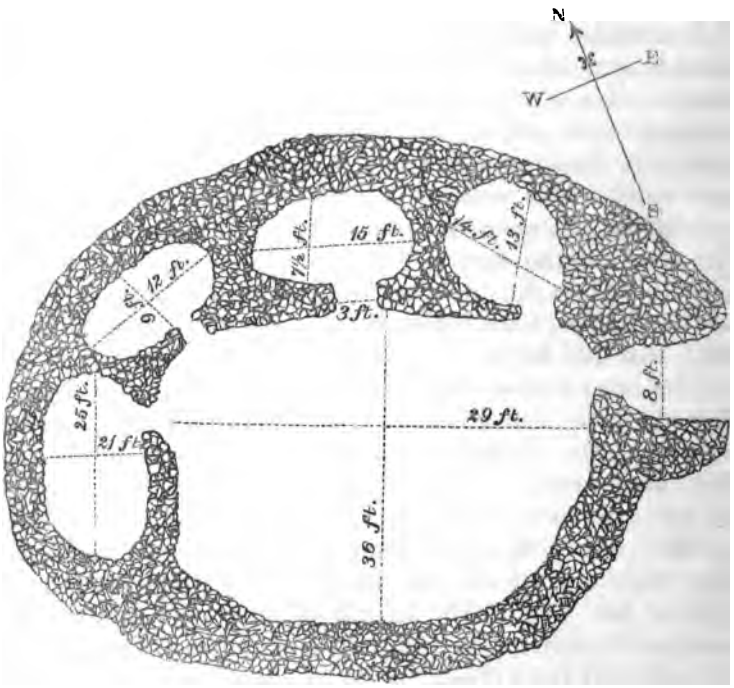
mile north of the village of Chyoster, on the southern side of a commanding hill, is an ancient village, which, being at present without a name, I will call *Old Chyoster*,[1] It consists of a dozen or more oval, very thick and strong uncemented walls of stone, covered with turf, furze, and broom, having each only one entrance, rather more than 6 feet wide, and that generally from about south-east. Within and concentric with each of these walls, another stone wall was erected at the distance of 6 or 8 feet from the outer wall, and the space between the two walls divided into two, three, or more oval apartments, each faced up internally with a wall of rough masonry, and each having a doorway, between two and three feet wide, leading into the open central area. These separate apartments were probably (like the ditch between the two concentric walls of the Crellâs) roofed with branches of trees, and covered with turf and furze.

The most perfect of these enclosures is correctly represented by the following woodcut,[2] from which it will be seen that the entire enclosure externally (including the entrance) occupies about 90 feet from east to west, and 70 from north to south; the entrance from the adjoining grounds being as usual from about south-east, to admit the earliest beams of the rising sun during the winter half of the year. The height of that part of the wall nearest the hill-top is about five feet above the external ground, but the opposite part, on the descent of the hill, is not less than 10 feet, and is also much thicker, as is the case likewise with the corresponding part of the wall of the Crellâs. The inner wall is built only on the northern and western parts of the outer wall, and the space between them is divided into four apartments, (three on the north, and one on the west,) varying in length from 12 to 25 feet, each having an entrance from 2 to

[1] *Chy-oys* signifies "the aged house."

[2] Mr. Blight, whose work I have referred to in the Second Chapter, and who kindly made this drawing at my request, was the first to direct public attention to this British village, at a lecture in Penzance last year.

3 feet wide, opening from the central area. Some of these entrances have pillars, or walls, on each side, 4 or 5 feet high. Had the apartments extended completely round the area, the entire building would have resembled the *Crellâs*, and also the inner wall of Ch'ûn Castle, with



Ancient Dwelling at Old Chyoster.

the pent-houses erected against and around it (*ante*, p. 35). But this would not have been desirable, (unless the occupants were straitened for want of room,) as the apartments on the southern or lower side would have had less sunshine, and have been more exposed to the wet from drainage than the northern or higher side, where most of the apartments actually are. The great difference between this enclosure and that of the Crellâs (each having its largest apartment at the end farthest from the entrance) is, that in the Chyoster enclosure the largest apartment is *inside* the main wall, and thus diminishes

the open area in the centre, whilst in the Crellâs enclosure the largest apartment is *outside* the main wall, with a communication through it. This largest apartment, as well as that in the Crellâs, may have been the only fireplace belonging to the enclosure. Some acres of the sloping land adjoining Old Chyoster have been levelled into terraces, rising one over another, which may have served as folds for cattle, or as places for recreation and martial exercises. Whether the inhabitants of the villages noticed in this Chapter used war chariots, I have no means of judging; but all the enclosures within which apartments were constructed, are, without exception, like the British towns before described, furnished with entrances not less than 6 feet wide. There is also at Old Chyoster a remarkable subterranean cave, which, like that at Higher Bodennar, already described by Borlase, is at the southern end of the village. It had been walled up with stone on each side, and roofed with huge slabs; but these walls and roof had been removed many years ago to the extent of several yards, and it was supposed that the cave was thus totally destroyed. But at my last visit to Chyoster, I called on the aged tenant of an adjoining farm, who not only accompanied me to the cave, but descended into the higher end of it, and from thence informed me that the walls and roof at that end still remained undisturbed, adding, with all the animation of a fresh discovery, that the two walls were inclined very considerably towards each other. This induced me to descend also, when I saw that each layer of stones considerably overhung that immediately beneath, so that the tops of the two walls, on which the roof rested, were very much nearer each other than their bases. This cave, which is about $4\frac{1}{2}$ feet wide, has not yet been fully explored, and it is not unlikely that something still more remarkable may be discovered in it, possibly something resembling what I had previously observed, and have next to describe.

Of all the subterranean caves in this district the most remarkable is that which I lately saw by mere accident

in the British village at Chapel Euny, in Sancreed. This very ancient village, hitherto unnoticed, is constructed very similarly to Old Chyoster, as far as its much more dilapidated condition allows me to judge. It is a half of a mile west-south-west of Caer Brân, and about a furlong east-south-east of the celebrated well in Chapel Euny. Immediately above it, on the north-west, is a natural carn, or pile of rocks. This very singular cave consists for the most part of a deep trench, faced up with uncemented stone walls, and roofed with huge slabs covered with turf, not rising above the level of the adjoining ground. It extends 30 feet from north-north-west to south-south-east, and then branches eastward, and probably also to the south or south-west. So far it accords with the description of an ordinary British cave. But here the resemblance ceases; for its floor, as I was informed by the miner who opened it about three years ago, was well paved with large granite blocks, beneath which, in the centre, ran a narrow gutter, or bolt, made, I imagine, for admitting the external air into the inmost part of the building, from whence, after flowing back through the cave, it escaped by the cave's mouth,—a mode of ventilation practised immemorially by the miners in this neighbourhood, when driving adits, or horizontal galleries, under ground. The following, however, is its most striking peculiarity. Its higher or northern end consisted of a circular floor, 12 feet in diameter, covered with a dome of granite, two-thirds of which are still exposed to view; and my informant had observed a considerably greater portion of the dome roofed chamber. Every successive layer of the stones forming the dome overhangs considerably the layer immediately beneath it, so that the stones gradually approach each other as they rise, until the top-stones must originally have completed the dome, not, however, like the key-stones of an arch, but by resting horizontally on the immediately subjacent circular layer. These top-stones, which were very large, and probably the layer next under them, had all fallen into the cave before the miner opened it. The height of

the present wall of the dome is about 6 feet above the lowest place I could see. How much lower the original floor might have been in that part of the cave I could not ascertain. The cave, although partially opened, would still occupy a labourer some days before the stones and rubbish could be removed for its complete examination. No pottery, nor anything else, appears to have been found in the excavation. This is probably the cave referred to by the late Rev. John Buller, fifteen years ago, in his *Account of St. Just*, p. 82, but at that time it had "not been examined." The subterranean caves thus found in British villages may have been used either as storehouses, or as places of retreat in cold weather, when the villagers dared not light their fires, lest the rising smoke should betray them to their enemies.

The only other Celtic remains which I have to notice are the Carn Yorth Circles, on the hill-side, a furlong or two east-by-south of the top of Carn Kenidjack, 5½ miles west-north-west of Penzance, and immediately above a deep well, as ancient probably as the circles themselves. The lower and smaller circle consists of the foundation of a very thick stone wall, formed of massive blocks of granite, having an area within it 90 feet in diameter, which, for the use of its occupants, may have been divided into apartments like Ch'ûn Castle, or the enclosures in Old Chyoster, as represented in the preceding woodcut. Close above it is the other circle of thrice its diameter, formed by a wall of stones and earth, and used no doubt for the same purposes as the terraces at Old Chyoster.

All the ancient towns, villages, and residences mentioned in this and the preceding Chapters are, except the cliff castles, situate in the interior of the district, and command very extensive land and sea views. Some of them are probably 3000 years old, but they furnish no data by which we can ascertain either their absolute or their relative ages.

What subjects for gratitude are here presented to us! Our remote predecessors lived in *caves*, and in *thickets*, and in *rocks*, and in *high places*, and in *pits* (1 Samuel,

xiii. 6). But there is now no need of *hill castles*, or *cliff castles*, for our protection; nor of *caves*, or *thickets*, or *pits*, for our concealment; every man dwells safely under his own roof, none daring to make him afraid; and surely the opportunity of contrasting the rude, comfortless dwellings of our ancestors with our present snug, well-furnished cottages, is a sufficient reason for preserving from destruction the ancient remains which are still to be seen on the tops or sides of our hills, and on our projecting headlands.

CHAPTER VIII.

ROMAN AND OTHER ANTIQUITIES.

Roman Coins discovered in Mines, Barrows, &c.—Roman Camp and Roman Antiquities found therein—Inscribed Stones in St. Hilary, St. Erth, St. Just, Phillack, Madron and Gulval—Christianity, when introduced—Amphitheatre in St. Just—Sepulchral Monuments in Truen and Drift.

We pass now from the prehistoric to the Roman period.

Norden remarks that the Romans "took their turn to search for tin, as is supposed by certain of their money found in some old works renewed."[3] Leland says that at Treen, in St. Levan, was found a brass pot full of Roman money. In 1723 some small brass coins were found in an urn in Kerris in Paul. Carte, in a note to his *History of England*, observes that, in the beginning of the last century, many Roman coins were discovered in barrows in Ludgvan, amongst which were some of Claudius, Nerva, Adrian, Antoninus Pius, L. Verus, Lucilla and Faustina. In Towednack also, eighty Roman silver coins were found in 1702 (as Mr. Tonkin relates), beneath a buried cromlêh, by the side of an urn full of ashes; some of them were of Valentinian I. and Arcadius: and Carew states that he had a brass coin of Domitian, found in an old tin work.[4] An urn of Roman coins was discovered in Morvah, in 1789.[5] At Boscaswell, in St. Just, Borlase mentions having heard from his father "that some workmen removing a bank had found near a hundred Roman coins. Antoninus Pius was very plainly to be read on some of them." In the same parish, says Mr. Buller, the copper coins of Carausius "are frequently found."[6] In draining the Marsh, near Marazion, an earthen pot was found, containing nearly a thousand Roman "copper" coins of the emperors who lived be-

[3] Speculi Britanniæ pars. p. 12.
[4] See Drew's Cornwall, i. pp. 368, 369.
[5] *Ibid.* ii. p. 497.
[6] Buller's St. Just, pp. 80, 81.

tween the years 260 and 350.[7] In 1825, another vessel of coins, some of bronze, and others of brass, was discovered, in removing part of the eastern cliff to make the causeway across the estuary of Hayle. It was of pure copper, and contained some thousands of small coins of very rude manufacture, many of them bearing the names of Tetricus and Victorinus, usurpers in the time of the Emperor Gallienus, about A.D. 260. Mr. Carne[8] supposes they were coined by the Romans not far from the spot where they were discovered, the remains of a Roman camp, in the estate of Bosense, being about two miles from it.

This Roman camp, or what now remains of it, forms part of a field, half of a mile north-east of Relubbus, on the northern side of the road from thence to Leeds Town. The path from the village of Bosense to St. Erth Church passes through it. Although situated on a gentle eminence, it commands, on every side, a very extensive prospect. Its form (so to speak) was rectangular, with the *internal* angles rounded off, the *external* corners being of much greater strength than the rest of the embankment, and occupying proportionally more ground. Its length is about 50 yards, its breadth 45. This is the only decidedly Roman camp of which there are any remains in the Land's End district: for the Romans generally had no occasion to form new camps here, as most of our hills were already well fortified.[9] Within this enclosure a well was discovered, about a century since, $2\frac{1}{2}$ feet in diameter, and 36 feet deep, with holes hewn out in its sides capable of admitting the human foot, and serving as a ladder. The well (which was dry, and had been filled in) contained two Roman vases, or *pateræ* (one with, and the other without handles); also a large jug *(præfericulum)*; a millstone, 18 inches in

[7] Drew's Cornwall, ii. p. 331.

[8] Transactions of Geological Society of Cornwall for 1825, p. 136.

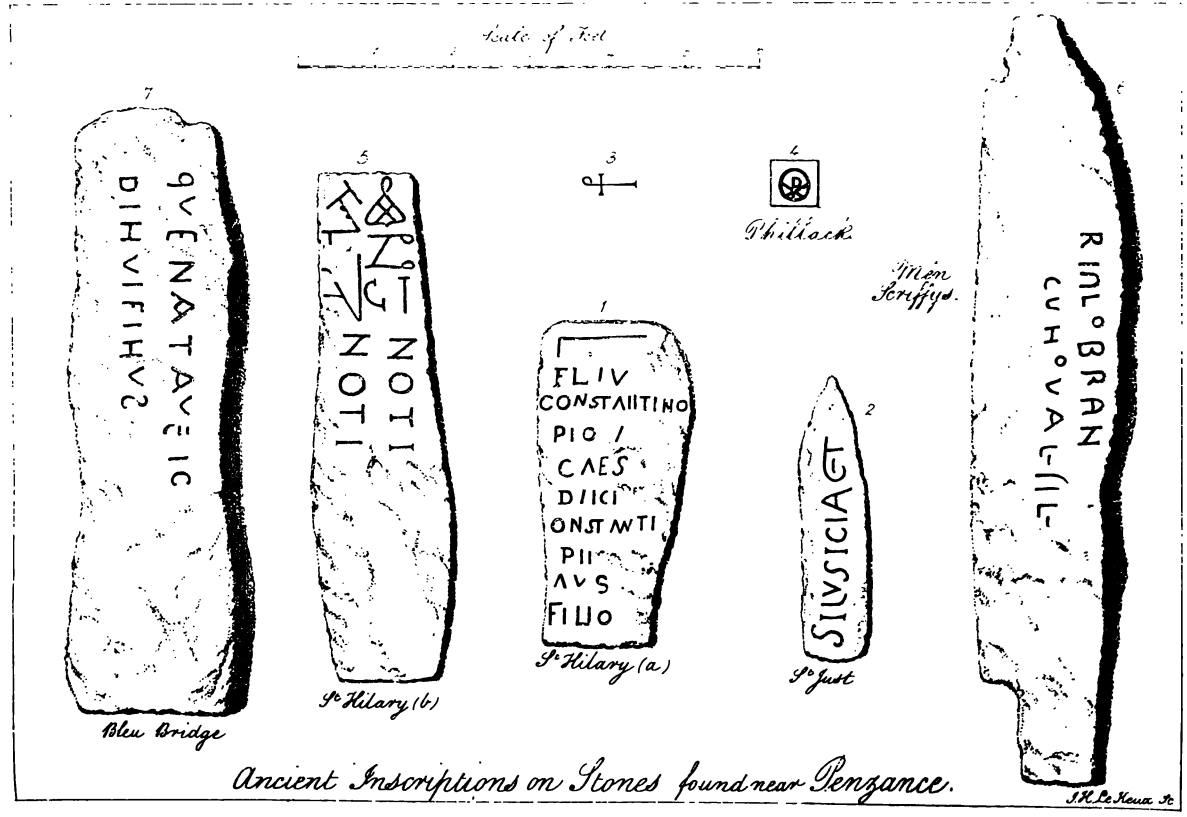
[9] At Godolphin, about half a mile from this camp, an urn was found in 1779 filled with Roman copper coins.—Drew's *Cornwall*, i. p. 369.

diameter, ("such as, without any material difference, is still used in the islands of Scilly,") and two stone weights. The *paterœ* and jug were made of tin. Borlase, from whom I gather these facts, has given an engraving of the camp, the jug, and the patera without handles[1] (which last much resembles the stone vase found at Kerris-vean, fig. 5 of plate prefixed to Chapter V.) The bottom of the patera, on the inside, is flat, 2½ inches in diameter, and bears in a circular line a rude engraving, consisting of a mixture of Greek and Roman letters, which Borlase reads thus "*Livius Modestus Driuli filius Deo Marti.*" This fort, which was evidently "a fixed garrison, and not a temporary fortification," "is situated in a direct line leading from Truro to Mount's Bay and the Land's End." And Borlase adduces it, with the Roman antiquities found in the well, as a fresh proof "that the Romans came into Cornwall, conquered it even to the very extreme parts, and had all the appendages of victory as ways, forts, garrisons, and resided here as governors in the same manner as they did in the other parts of Britain."[2]

Of the ancient inscribed stones in this district, the only one decidedly Roman formed part of a wall of St. Hilary Church, (4¾ miles east-by-north of Penzance,) before it was taken down to be rebuilt in 1853. It is now placed in the west wall of the walk leading from the churchyard gate to the church porch. The stone, which was taken from a neighbouring quarry, is very roughly hewn, about 4½ feet high, 1½ broad, and nearly a foot thick. The inscription originally occupied ten lines. Fig. 1 is a correct copy of the legible part of it. The first of the ten lines is now effaced. In the second line there were, apparently, two or three letters after the *u;* and, in the fourth line, a word appears to have followed *pio*. In the third line, the last two Ns are less distinct than the other

[1] This patera and the jug were deposited in the Museum Ashmoleanum at Oxford.

[2] Antiquities, (Second Edition, 1769,) pp. 316–319.



Ancient Inscriptions on Stones found near Penzance.

its roofs were covered with snow. The tower, with the spire erected on it, was the only portion that escaped destruction. The old church is now replaced by a handsome edifice of the early Middle-Pointed Gothic style, agreeing with the architecture of the beginning of the fourteenth century, when the old tower, which still remains, is supposed to have been built.[5]

The place where this stone, when inscribed, was originally fixed, and the occasion of the inscription, are matters only for conjecture. In the *Quarterly Review* for October, 1857, a writer on Cornwall says:—

"It is scarcely possible to doubt that this western region was the seat of a flourishing Christian community, which ignored Roman tradition and discipline, kept Easter after the Greek fashion, and derived its distant origin from that oldest mother of Churches, the patriarchal seat of Jerusalem."—p. 318.

Amongst the many proofs of this, I may notice the fact that nearly all the most ancient crosses in Cornwall are Greek crosses, and the greater number of them have had Latin crosses subsequently carved upon them. This I learn from two clergymen, who have made the subject their study. That some of the Apostles preached in the "British islands" we gather from Eusebius; and that St. Paul preached here was the opinion of Bishop Stillingfleet.[6] Others maintained that Bran, the father of Caractacus, (Caradog,) (accompanied by four others ordained by St. Paul,) first introduced Christianity into Britain; Bran having been detained at Rome as a hostage all the time that St. Paul was there, so that he had ample

[5] This was probably about A.D. 1313, when, by "the confirmation of the endowment to the vicar, the dead of Marazion were for the first time allowed, from the danger of passing with them to the Mount, to be buried at St. Hilary."—Drew's *Cornwall*, ii. p. 331.

[6] Origines Britannicæ, pp. 36–43. If St. Paul visited Britain, his first landing-place may have been St. Michael's Mount, the ancient Iktin; for how (says Sammes in his *Britannia*) could Britain receive the gospel at that early period "but by sea? because so many nations as interpose by land could scarce be passed by; and if by sea, no place so likely for it to set its first foot in as Cornwall, by reason of its Mediterranean trade for tin."—(Quoted in Buller's *St. Just*, p. 22.)

opportunities of being instructed by the Apostle in the Christian faith.[7] Assuming, therefore, that numerous churches, including one in St. Hilary, had been built in this island during the first three centuries, and that all these churches, as well as those in the rest of the Roman empire, were destroyed during Diocletian's persecution in the beginning of the fourth century, it is probable that soon afterwards, when Constantine the Great embraced Christianity, this church, amongst others, was rebuilt, and the stone may have been then engraved, and placed in the new church by that part of Constantine's army then stationed at the Roman camp already described, which was only two miles distant. And if Constantine's eldest son had received Britain for his portion of the Roman empire at the time of the completion of the church, his name would, doubtless, have been inscribed rather than his father's. Some centuries afterwards, when the church became dilapidated, and was again rebuilt, this stone (which is far from being ornamental) might have been used as common building material.

The only other inscribed stone in this district that bears on its face any indication of its age, is that found at Hayle, in St. Erth, in December, 1843, in one of the sides of the moat of an ancient cliff castle at Carnsew. It is 6 feet long, a foot wide, and 8 inches thick. It had fallen from its erect position, and was lying horizontally at the depth of about 4 feet from the surface, immediately beneath a thin stratum of sand. On the north of it was a grave, 6 or 8 feet long, lying east and west, excavated in the ground beneath the sand, and walled with unhewn stones placed on their edges, over which other stones were laid as a covering. This grave was filled with a mixture of sand, charcoal and ashes, and entirely covered with a loose heap of stones, the top of which was considerably beneath the surface of the soil.

For the preservation of the monument, the late Mr.

[7] Williams' Ancient British Church, (1844,) pp. 53–55. Smith's Religion of Ancient Britain, (1844,) p. 149.

Hayle.

and of which he has given a description, with a plate, in his *Antiquities*:—

"It was an exact circle of 126 feet diameter; the perpendicular height of the bank, from the area within, now 7 feet; but the height from the bottom of the ditch without, 10 feet at present, formerly more. The seats consist of six steps, 14 inches wide, and 1 foot high, with one on the top of all, where the rampart is about 7 feet wide. The plays they acted in this amphitheatre were in the Cornish language, the subjects taken from Scripture history."—p. 196.

This amphitheatre, which had benches of stone, has now almost wholly disappeared.

An inscribed stone, as old perhaps as the last, formed one of the foundation stones of the late church in Phillack, until it was taken down to be rebuilt in 1856. It is $7\frac{3}{4}$ feet long, and now stands outside the wall of the "vestry," in the south-eastern corner of the church-yard, but the inscription appears to be illegible. A small stone was then also discovered, forming part of the walls of the same church, and bearing a rude engraving of the monogram represented by fig. 4, being the first two letters of ΧΡΙΣΤΟΣ, with the symbol of eternity around them. The diameter of the circle is about 5 inches. This stone may now be seen in the wall of the new church porch, directly over the apex of the arch of the doorway.

Another inscribed stone, about $6\frac{1}{2}$ feet long, formed part of the foundation of one of the walls of St. Hilary Church, and was found there at the same time with that inscribed to Constantine II., already noticed. The inscription is longitudinal, consisting of two lines, each beginning with what appear to be symbolic characters, and finishing with the word NOTI, as in fig. 5. The symbolic characters of the upper line are very different from those of the lower, although they are in each case followed by NOTI. In neither line is the letter N the pure Roman capital, with a diagonal cross stroke; but, in the first line, the cross stroke deviates towards a horizontal one, and, in the second line, it approaches still nearer to a horizontal stroke. It is now placed close to

the church-yard gate, on the right hand side of the walk leading to the church porch.

The above monuments have been discovered since Dr. Borlase published his *Antiquities of Cornwall* in 1754. Of those known in his day, the most ancient, as he considered, was the *Mên Scriffys*, "the inscribed stone," in Madron, a quarter of a mile south-west of the top of Carn Galva, a high and most remarkable hill, with two heads, the eastern side of which is very precipitous. Borlase has given a drawing of it, from which fig. 6 is taken, and which I believe to be correct, although I have not compared it with the original, the present position of the stone not admitting of the inscription being read. It is $9\frac{3}{4}$ feet long, $1\frac{2}{3}$ wide, and $1\frac{1}{2}$ thick; the inscription at length would be *Rialobranus Cunovali filius;* "Rialobran, the son of Cunoval."[4] "In this monument (says Borlase) the cross stroke of the Roman N is not diagonal, as it should be, nor yet quite horizontal, (as it is observed by the learned to be under the sixth century,) wherefore I think it highly probable that this inscription was made before the middle of the sixth century." He also argues that "it was written before the Roman alphabet was corrupted, that is, before the letters were joined together by unnatural links, and the down strokes of one made to serve for two, which corruptions crept into the Roman alphabet (used by the Cornish Britons) gradually after the Romans went off, and increased more and more till the Saxon letters came into use about Athelstan's conquest."[5] But this corruption of the Roman characters is no argument of the inscription being subsequent to the departure of the Romans, for stones have been found inscribed to the usurper Tetricus,[6] about A.D. 270, wherein

[4] The next parish to that where the monument lies is called Kynwall, (or Cynval,) according to the old orthography, though now corruptly pronounced Gylval, as Lhuyd observes in his *Archaeologia Britannica*, p. 253.

[5] Antiquities, p. 358.

[6] Akerman's Coins of the Romans relating to Britain, (1844,) p. 106.

this kind of corruption is seen to a much greater degree than in any of the inscriptions above noticed.

The other inscribed stone, of which Borlase has given an engraving, and of which fig. 7 is a correct representation, served in his time as a foot-bridge in the valley of Barlowena, (Bleu Bridge,) exactly half of a mile west of Gulval Church. It now supports an iron rail by the side of the bridge. It is $7\frac{3}{4}$ feet long, $1\frac{2}{3}$ wide, and one foot thick. "This inscription (says Borlase) cannot be so old as the former, for here are two sorts of the letter N, the first true Roman, the other as used in the sixth century, that is, as the Roman H. There are three dashes at the end of the name instead of one: the second I in *filius* is linked to the L, and the S is inverted. The cross stroke in the A is not straight, but indented."[7] In words at length it would run *Quenatavus Icdinui filius.*

In this and the second chapters all the ancient stones marked on the map have been noticed, except the two-stone sepulchral monument at Truen, in Madron, and the much larger two-stone monument, probably also sepulchral, at Drift, in Sancreed. That at Truen is in a field adjoining the south side of the road from Penzance to New Bridge, and within half of a mile of the latter place; the stones are 10 feet apart, in a line east-north-east and west-south-west, and between them was found, about a century ago, a grave, containing a black greasy earth. "The grave (says Borlase) came close to the westernmost and largest stone, next to which I imagine the head of the interred lay." The other two-stone monument consists of two huge unshapen pillars, standing north-west and south-east, the one 9, the other 7 feet above ground, and 18 feet apart, one of the pillars being in a field adjoining the south-east side of the road from Penzance to the Land's End, and about a furlong south-west of the "four lanes' end" at Drift.[8] These uninscribed monuments are probably more ancient than the inscribed stones above noticed.

[7] Antiquities, p. 359.

[8] *Ibid.* p. 176.

CHAPTER IX.

ANCIENT CUSTOMS.

Midsummer *Festival—Bonfires and Torches—Children wearing Wreaths of Flowers—Ancient Superstitions—Quay Fair, and* Corpus Christi *Fair.* Midwinter *Festival—Christmas Stock—Liberality of the Rich—Singing Carols—Guise Dancers—the Hobby-Horse.* Spring *Festival—May-day—May-pole—Ladies and Gentlemen Dancing through the Streets in Helston—the Tune on that occasion—Supposed to be Ancient British Music—Superstitious Dippings in the Sea and in Running Waters—the Hobby-Horse.* Local *Festivals—Injunction of Henry VIII.—Great Hospitality of the Inhabitants—Hurling compared with the American-Indian Ball Play—Cornish Inscription on a Hurling Ball—Conclusion.*

Coeval probably with our remotest antiquities are some of the customs still remaining in the Land's End district. These customs are observed at our four principal annual festivals, which, though now kept as Christian holidays, appear to have been originally held in honour of the sun, moon and stars.

I.—Instead of considering them in the order of their occurrence, I will begin with the Midsummer festival of the sun.

It is the immemorial usage in Penzance, and the neighbouring towns and villages, to kindle bonfires and torches on Midsummer-eve; and on Midsummer-day to hold a fair on Penzance Quay, where the country folks assemble from the adjoining parishes in great numbers to make excursions on the water. St. Peter's-eve is distinguished by a similar display of bonfires and torches, although the "Quay-fair," on St. Peter's-day, has been discontinued upwards of forty years.

On these eves a line of tar-barrels, relieved occasionally by large bonfires, is seen in the centre of each of the principal streets in Penzance. On either side of this line young men and women pass up and down, swinging

round their heads heavy torches made of large pieces of folded canvass steeped in tar, and nailed to the ends of sticks between three and four feet long; the flames of some of these almost equal those of the tar barrels. Rows of lighted candles, also, when the air is calm, are fixed outside the windows, or along the sides of the streets. In St. Just, and other mining parishes, the young miners, mimicking their fathers' employments, bore rows of holes in the rocks, load them with gunpowder, and explode them in rapid succession by trains of the same substance. As the holes are not deep enough to split the rocks, the same little batteries serve for many years. On these nights, Mount's Bay has a most animating appearance, although not equal to what was annually witnessed at the beginning of the present century, when the whole coast, from the Land's End to the Lizard, wherever a town or a village existed, was lighted up with these stationary or moving fires. In the early part of the evening children may be seen wearing wreaths of flowers —a custom in all probability originating from the ancient use of these ornaments when they danced around the fires. At the close of the fireworks in Penzance, a great number of persons of both sexes, chiefly from the neighbourhood of the quay, used always, until within the last few years, to join hand in hand, forming a long string, and run through the streets, playing "thread the needle," heedless of the fireworks showered upon them, and oftentimes leaping over the yet glowing embers. I have on these occasions seen boys following one another, jumping through flames higher than themselves. But whilst this is now done innocently in every sense of the word, we all know that the passing of children through fire was a very common act of idolatry,[9] and the heathen believed that all persons, and all living things, submitted to this ordeal, would be preserved from evil throughout the

[9] Lev. xviii. 21; 2 Kings xvi. 3; Jer. xix. 5. The ancient worship of the sun in this district has been noticed in the latter part of the Second Chapter.

ensuing year. A similar blessing was supposed to be imparted to their fields by running around them with flaming torches.

Besides the large fair on the Quay on Midsummer-day, already noticed, there is another large fair at Penzance on *Corpus Christi* Thursday, which latter falls, in 1859, on Midsummer-eve; and, in 1886, on Midsummer-day, the latest day on which it can ever occur.

II.—To the *Midwinter* festival of the sun, fires were as essential as to the *Midsummer* festival; and the following custom was immemorially observed here until within the last fifty years. On the decayed stump of an old tree was painted, or carved, the figure of a very old man, called "Old Father Christmas," identical, perhaps, with "Old Father Saturn." As this senile figure was always burnt on Christmas-eve, which was formerly the last day of the solstitial year, the ceremony appears to have been emblematical of the death of the old year. This log, or "Christmas stock," lasted throughout the festival, and a piece of it was laid aside for lighting the next "Christmas stock."

The observances at this festival appear to have resembled in many respects those of the *saturnalia* held at this season in the south of Europe. At the *saturnalia* universal festivity and freedom prevailed, while masters waited on their slaves at dinner, in commemoration of "the golden age" of Saturn, when the earth, without labour, brought forth abundantly, and when men lived as brethren. So also at our Christmas festival the houses of the rich used in former ages to be open to all; and high and low, rich and poor, met together as members of one family, to enjoy the ingathered fruits of the earth. Although the rich do not, at the present day, thus indiscriminately entertain their neighbours, it is the custom here for masters to give their apprentices and work-people refreshments on Christmas-eve. It was the practice also, until within the last fifteen years, for the grocers to give their customers, amongst the labouring classes, the mate-

rials for making Christmas cakes.[1] Throughout the Christmas week the singing of carols is very general; and early in the morning of Christmas-day, long before day-break, choirs of singers perform, oftentimes very sweetly, under our windows.

Our Christmas plays, also, are very similar to those of the *saturnalia*. The *guise dancers* (the same as the *guisards* of Scotland) may be always seen in the streets of Penzance in the evenings from Christmas-day to "Twelfth-day," going to or from the houses wherein they are permitted to perform, attired in fantastic dresses, and variously dis*guised*. A well-known character amongst them, about fifty years ago, was the *hobby-horse*, represented by a man carrying a piece of wood in the form of of a horse's head and neck, with some contrivance for opening and shutting the mouth with a loud snapping noise, the performer being so covered with a horse cloth, or hide of a horse, as to resemble the animal whose curvettings, biting, and other motions, he imitated. Some of these "guise-dancers" occasionally masked themselves with the skins of the heads of bullocks, having the horns on. This masking, and acting in imitation of brute creatures, may have been originally of a supplicatory nature, and instituted for imploring the gods to preserve from death and disease the cattle represented by the performers.[2]

III.—Festival of the moon.

The spring festival seems to have been originally that of the moon, represented amongst the Saxons by the goddess Easter. It begins on the 1st of May, by parties of young persons going into the country at daybreak to regale themselves at the dairies, and returning soon after sunrise with flowers and green branches to adorn the May-pole, around which they then danced. Formerly there was scarcely a town or parish without its May-pole.

[1] Esther ix. 22.

[2] See Catlin's North American Indians, i. p. 127.

The last that remained in this district was that which stood at Marazion about fifty years ago. Throughout this day, and for days afterwards, there is in Penzance an incessant blowing of horns by children—a custom said to be derived from a festival of Diana.[3]

In the ancient borough of Helston, thirteen miles east of Penzance,[4] the spring festival is held on the 8th, instead of the 1st of May, in consequence, no doubt, of the 8th being the festival of the Apparition of its tutelary angel, St. Michael, whose conflict with the dragon is represented in the town arms. In that borough families of the first respectability take part in the amusements; the shops are all closed, and there is a general holiday. At daybreak, the men-servants and maid-servants commence the festivities, by dancing into the country to partake of the usual refreshments, and to gather flowers and green boughs, with which they return dancing into the town. At one o'clock the ladies and gentlemen, with flowers in their dresses, dance through the streets, private houses, and gardens, in exercise of their immemorial privilege. During the afternoon other parties of dancers follow. In the evening the ladies and gentlemen, in ball dresses, used, until within the last twenty or thirty years, to reappear in the public street, and dance from thence into the assembly room, thus opening the ball which closes the day.

The tune to which they dance "is supposed," says Mr. Davies Gilbert, "to be a remnant of British music; one very like it, if not the same, has been found in Ireland, and, according to report, in Scotland." It "is preserved by Edward Jones, in his *Musical and Poetical Relics of the Welsh Bards.*"[5] These Relics I have not seen; but the following is a correct notation of the air as immemorially played at Helston on this day:—

[3] Fosbroke's Encyclopedia of Antiquities, p. 578.

[4] Although Helston is not within this district, yet a great number from this district always attend the Helston festival.

[5] Gilbert's Cornwall, ii. p. 166.

The Furry Dance.

Con Spirito.

That this festival at Helston was originally instituted to commemorate the return of spring is evident, not only from the time of the year in which it is held, and from the manner of its celebration, but also from the chorus of the song still chanted on the occasion. It is true that the song itself contains allusions to modern events, but the chorus, which I take to be an old translation of the original song, has all the marks of ancient simplicity, and naturally expresses the ideas uppermost in the minds of those who were rejoicing at the departure of winter, and welcoming the return of spring. The chorus is,—

"And we were up as soon as any day—O!
And for to fetch the summer home—
The summer and the May[6]—O!
For summer is a come—O!
And winter is a gone—O!"

The tune, or chant, applied to this chorus is very different from that above given, to which they dance through the streets. Many regard this festival as the remains of the Roman *Floralia*, and the day, therefore, has been latterly called *Flora-day*. But from what has been stated, as well as from its ancient and still popular name, "the Furry," there is reason for supposing it was observed in this island long before the Roman period.

Furry, or forray, "forage," appears to be derived from the same root as the Welsh word *ffforio*, "to spy out,"[7] and the Cornish word *forrior*, "a thief;"[8] and therefore *forray*, *ffforio*, and *forrior*, as well as the festival of the *Furry*, are all, apparently, of ancient British origin. "To make a forray and get spoil in the country," is the very

[6] The green branches and flowers brought in from the country are called "May," just as the evergreens which adorn our churches and houses at Christmas are called "Christmas."

[7] Owen's Welsh and English Dictionary.

[8] Borlase's Cornish Vocabulary.

object of the Helstonians, when sallying forth at daybreak into the country, with drums and fifes playing the forray tune. Trees, shrubs and gardens are stript and plundered, in order that the leaves and flowers may adorn their streets and ball-rooms; and such is the completeness of the spoliation, that when it is over an ungathered flower can scarcely be found. Hence the privilege, already mentioned, of dancing through the houses into the private gardens behind them. At a forray of this description, Flora herself might, without inconsistency, have presided.

A different kind of custom at this festival remains to be noticed. In the north-eastern part of this hundred it has been the immemorial usage to bathe in the sea on the first three Sundays in May; and, in this district, persons having weak or diseased children, take them to Madron Well, or to that of Chapel Euny, on the first three Wednesdays in May, an hour before noon, and dip them thrice in the running water, against the stream, in the hope of restoring them by this operation to health or strength; not believing that these waters have any virtue if resorted to on any other days of the year, or at any other hour of the day.[9] At Padstow, on the northern coast of Cornwall, the "hobby-horse,"[1] or effigy of a horse, is, at this festival of the moon, dipped in a pool of water, and for the same reason, perhaps, that a similar figure was, in Ireland, passed through fire at the festival of the sun, viz., to preserve the cattle of the inhabitants, which were all represented by it, from death and disease;[2] for when men began to worship the sun and the moon, they would naturally conclude that the way of access to these idols was through fire and water, the two elements by which they were represented.

[9] Some years since I had the curiosity to go with a friend to Chapel Euny on one of these Wednesdays, and, whilst watching at a distance, we saw two women come to the well at the appointed hour, and perform this ceremony on an infant.

[1] Drew's Cornwall, i. p. 720.

[2] Gentleman's Magazine, 1843, (July,) pp. 23, 24; and 1795, (vol. i.) pp. 125, 274.

IV.—Festival of the stars.

Whilst our general festivals were originally dedicated to the sun and moon, our local ones were held in honour of the stars, the supposed departed spirits of great benefactors, or shining lights, in the places where they had dwelt. These might still be called the festivals of the stars,[3] inasmuch as most of them are kept professedly in memory of the saints by whose instrumentality Christianity was planted here. According to the injunction of 28 Henry VIII., the only authorized time for holding these local or parish feasts is the first Sunday in October, between the feast of "All Angels," and that of "All Saints." The royal mandate, however, was not generally complied with, and, in most cases, each parish begins its feast, as before, on the Sunday nearest or next after its own saint's day. The feast lasts about three days, during which the inhabitants entertain their friends from other parishes, whose visits they will have an opportunity of returning before their own feast again comes round. The hospitality of the Cornish on these occasions was unbounded. But the only place in this district where the custom is maintained with its ancient spirit is St. Just. Whoever goes to the feast of that parish is so heartily welcomed, and entertained with such an abundance of good fare, that nothing in all Britain can equal the conviviality. The drunkenness and rioting, however, which have too often accompanied these feasts, have, in most parishes, induced the principal inhabitants to discountenance them.

The common athletic amusements on these occasions were formerly quoits, wrestling and hurling. As the last of these is apparently confined to Cornwall, it merits particular notice. In this play, a century or two ago, two or more parishes contended against certain other parishes, each party having its own goal, which was either the mansion-house of one of the leading gentlemen of the party, a parish church, or some other well known place. A ball, about the size of a cricket ball,

[3] Daniel xii. 3.

formed of cork, or light wood, and covered with silver, was hurled into the air midway between the goals. Both parties immediately rushed towards it, each striving to seize and carry it to its own goal. In this contest, when any individual having possession of the ball, found himself overpowered or outrun by his opponents, he hurled it to one of his own side, if near enough; or, if not, into some pool, ditch, furze-brake, garden, house, or other place of concealment, to prevent his adversaries from getting hold of it before his own company could arrive. "The hurlers," says Carew,[4] "take their way over hills, dales, hedges, ditches," "through bushes, briers, mires, plashes, rivers;" sometimes "twenty or thirty lie tugging together in the water, scrambling and scratching for the ball." This Cornish exercise resembled so strikingly the present ball play of the North American Indians, that the following description of the latter is equally applicable to the former:—

"It is no uncommon occurrence," says Catlin,[5] "for six or eight hundred, or a thousand young men to engage in a game of ball, with five or six times that number of spectators." "In their desperate struggles for the ball, hundreds are running together, and leaping actually over each other's heads, and darting between their adversaries' legs, tripping and throwing, and foiling each other in every possible manner, and every voice raised to the highest key in shrill yelps and barks."

The great difference between hurling and the Indian ball play is that, in the latter, the ball is never touched by the hand, but every individual carries two sticks with a sort of pouch at the end of each, with which he strives to take up the ball, and throw it through the wicket, or goal, of his own party. The remarkable similarity between the two games argues the high antiquity of each.

Hurling between two or more parishes and others—and between one parish and another—has long since ceased in Cornwall. But hurling by one part of a parish

[4] Survey of Cornwall, (edition by Lord De Dunstanville,) p. 197.

[5] The Manners, Customs and Conditions of the North American Indians, by George Catlin, (1842,) vol. ii. pp. 123–126, with four plates illustrative of this ball play.

against another part is still played at St. Ives, in this district, as well as in other places in Cornwall. At St. Ives all the "Toms," "Wills," and "Johns," are on one side, while those having other Christian names range themselves on the opposite. At St. Columb, the townsmen contend with the countrymen; at Truro, the married men with the unmarried; at Helston, two streets with all the other streets.

Mr. Pearce, of Penzance, has two hurling balls won by his ancestors more than a century ago. The older one, $2\frac{3}{4}$ inches in diameter, belonged to the parish of St. Paul, and bears the following inscription in the Cornish language;—

"Paul Tuz whek Gware Tek heb ate buz Henwis, 1704."[6]

The first two words signify "Paul men," the owners of the ball. The last seven words may be Englished in the order of the engraving—"sweet—play—fair—without—hate—to be—called," which means the same as "fair play is good play." The other silver ball, 3 inches in diameter, has the following inscription:—

"The married men against the young.

"The gift of John Sickler to the parish of Gwinyar, June 11th, 1748."

Wrestling and quoits, which were also played at these parish festivals, are not nearly so general as they were fifty years ago.

The fires so indispensable at the solar festivals form no part of the requirements for that of the moon, or those of the stars, although many of the last are held in winter.

If the description in this and the preceding chapters of the antiquities and ancient customs of an important but almost unknown district should be instrumental in shedding light on any antiquarian remains in other localities, my labour in furnishing it will not have been in vain.

[6] This inscription shows that the Cornish language was generally understood in this district at the beginning of the last century.

CHAPTER X.

EXTRAORDINARY AGITATIONS OF THE SEA AND EARTHQUAKE-SHOCKS.

THE oscillations of the sea now to be described occur as frequently when earthquake-shocks are *not* observed, as when they *are*. These tide-like alternating currents occupy generally in each efflux as well as in each influx, from 5 to 10 minutes, and commence most commonly with an efflux.

"Some authors" says Mr. Mallet "have attempted to account for this" commencing efflux "by assuming that the water retains its level, while the land is suddenly elevated or thrown up out of it and again dropped down to its former level: but Darwin well says 'surely the waters close to land, even of a steep coast, would here partake of the motion of the land.' Darwin views this secession of the water as due to the first action of the great sea-wave formed or forming far out at sea. I have on the other hand" continues Mallet "endeavoured to show that it is due to the traversing along under the sea of the crest of the earth-wave of shock, which moves so fast as to force up a low broad unbroken ridge of water vertically over it, which is imperceptible while the earth-wave is moving under deep water, but becomes visible as it approaches the shallow shore; and the effect of the sudden coming in to land, of this earth-wave carrying the *forced sea-wave*, as it were, on its back, is, that at the moment they part company upon the beach, the beach itself is for the instant elevated to the height of the earth-wave and as instantly dropped again, so that slipping from under the sea, the earth-wave gives to the sea for the

moment the appearance of having retired and again advanced to its former level. (Dynamics of Earthquakes, Trans. Roy. Irish Academy, pp. 18, 20.)"[1] But the explanation thus proposed seems as untenable as those of all other geologists who have endeavoured to account for this phenomenon.

When these agitations happen on days when no earthquake has been observed, they have been ascribed by Mr. Mallet in his 1st Report on the Facts of Earthquake Phenomena not "to earthquake-shocks at all but to the sudden slippage under water of large masses of submarine banks of sand or mud."[2] As I had previously[3] referred them to assumed submarine earthquake-shocks, I have elsewhere shewn that his hypothesis is quite at variance with well known facts.[4] In his 4th Report, although still imagining a submarine landslip to be "A *vera causa*" he asks "is it *the* cause of any of these phenomena?"[5] I do not see how it can be even *a* cause. Prior to his 1st Report distinguished authors on both sides of the Atlantic had attributed these agitations (when unaccompanied with perceived earthquakes) to storms or unusually great and sudden augmentations or diminutions of the atmospheric pressure on the surface of the water.[6] But this hypothesis is equally at variance with the facts.

Having made these prefatory remarks I will now describe such extraordinary agitations of the sea in Mount's-bay, and such earthquake-shocks in this district as have been recorded during the present century—and then offer a new explanation of these agitations which shall reconcile all the observed facts.

1 Brit. Assoc., Report for 1850, p. 46. 2 Ibid, p. 61.

3 Trans. of the Royal Geol. Society of Corn., for 1843, p. 118.

4 Edinb. New Phil. Journal, for April, 1856, p. 285.

5 Brit. Assoc., Report for 1858, p. 130.

6 Edinb. Phil. Trans., xv. p. 621; and Silliman's Journal, as quoted in the Edinb. New Phil. Journal for January, 1847.

1843, July 5. The sea at Penzance this forenoon rushed suddenly from the shore in three vast currents, setting directly out of the bay against a strong southerly breeze, and eddying and foaming in a most extraordinary manner. The easternmost current flowed out from Penzance pier eastward of Carn Olva rock—the next passed between that rock and the Battery rock, and the westernmost started from the shore between the Battery rock and the Round rock[7] close at the feet of an old pilot who gave me the account but who did not wait to see the currents return. The precise time when the sea was first observed to flow out of Penzance pier was 11 30 a.m. (local time) an hour and a half after high-water, occupying in this efflux and in returning to its previous level between 15 and 20 minutes. This alternate ebbing and flowing continued without intermission for two or three hours, during which at the pier-head a fearful eddy whirled the boats in all directions. An hour after its commencement, two young men were bathing at the Battery rock. One of them entered the water on its western side and after swimming out to the point, was carried inward along the eastern side, with such rapidity, that he feared he should never regain the shore. The other (my informant) who was then standing on the eastern side of the rock, and could see that the current was only a few yards wide, plunged into it from that side, swam across it and then southward round the point—by which means he ascertained that the disturbance did not extend beyond a few yards south of the Battery point. He also dived through the current (about ten feet deep) and found it as strong near the bottom as on the surface,—the velocity when greatest being between three and four miles an hour.

At Newlyn pier 1 mile south-west of Penzance,

7 These three rocks are dry at low-water, the Battery rock being separated from the other two at high-water by channels each about 50 yards wide.

the sea first fell about 4 feet, rushing out with a great eddy, and then returned in the same state of agitation to its former level. This efflux and reflux occurred four times successively within about an hour and a half. The large fishing-boats, riding at their moorings in deep water near Newlyn, were whirled into an opposite direction by every change of the current.

At Mousehole, 1½ mile south of Newlyn, a large fishing-boat parted its hawser by the strength of the current and was carried out of the pier.

On the opposite side of the bay, at Porthleven, 10 miles east by south of Penzance, the commotion was first observed about the same time as at Penzance—the water rushing in along the western side of the harbour to the height of about 4 feet and then retiring principally by the eastern arm (which projects a considerable distance into the sea), thus converting the interior of the harbour into a fearful whirlpool. This continued some hours; during which a fisherman came in without suspecting anything unusual, as the sea near the pier-head, both inside and outside, was almost calm: but very soon one of the influxes carried his boat along with great impetuosity into the inmost part of the harbour and left it dry on the beach.

At Marazion, 3 miles east of Penzance, the disturbance was noticed about 1 p.m., when the sea suddenly rose and fell 4 or 5 feet. Afterwards when the natural causeway leading from that town to St. Michael's Mount had been left dry by the ebbing tide more than half an hour, the sea flowed back and again covered the central part of it.

Similar oscillations were observed this day in Falmouth harbour, along the shore between Falmouth Quay and Penryn, between 1 and 2 p.m.—at Plymouth about 11 a.m. (an hour after the barometer there had reached its minimum)—at Bristol about 2 p.m. (the barometer being at or near its minimum)—

at Dunbar a little after 6 p.m.—at North Berwick between 1 and 2 p.m., (and twice afterwards on the same day)—at Arbroath at 5 p.m. (where the oscillation continued during a calm and throughout the thunder-storm there between 7 and 9 p.m.)—and at the Orkneys at 3 o'clock of the following morning, at or about the time of much thunder and rain. At the Scilly Isles the agitation was noticed on the same day as in Mount's-bay, but at what hour I could not learn: the sea there "at a short distance from the most southern part of the island (St. Mary's) was much agitated, as if some violent force from beneath were lifting the body of water above, while the surrounding water was perfectly calm and smooth."

The barometer in Mount's-bay this day about noon was 29·50—lower than for 25 days before and for 47 days afterwards. The thunder-storm commenced near the Lizard about 5 a.m., and in its progress *northward* attained its greatest violence—at Gloucester between 3 and 5 p.m., (the hailstones in that neighbourhood measuring $3\frac{1}{2}$ inches in circumference)—at Birmingham at 5 15 p.m.—in Liverpool between 5 30 and 6 p.m. —at Norton, Sheffield, and Dumfries between 6 and 7 p.m.— in Edinburgh at 7 20 p.m.—at North Berwick at 7 40 p.m.—at Newcastle between 8 and 9—and at Kinnaird's head (seventy miles north of Aberdeen) at 9 45 p.m. In its course *eastward* the barometer reached its minimum—in Plymouth, about 10 a.m., and at Greenwich, at 6 p.m. This storm therefore advanced northward more rapidly than towards the east, and was in most places attended with violent wind; although at Glasgow, where it arrived about 7 p.m., there was no gale at all, as was the case also in Mount's-bay where no gale came on for several hours after the thunder-storm.[8] At Brighton and Chiswick,

8 Most of the occurrences on this 5th of July, except those in Cornwall, I have gathered from Mr. Milne's paper on the Oscillations of the Sea on that day, in the Edinb. Phil. Trans. xv. pp. 609-638.

the 5th of July was the warmest day of the summer.

1843, Oct. 30. Similar oscillations were observed at Penzance pier this day at 5 p.m., the tide being nearly two hours flood, the sea smooth, and the wind strong from N.E. with rain. The sudden rise was about 5 feet, by which a small vessel previously aground floated and was by the efflux which immediately followed, carried out several yards, directly against the wind; she was then borne in by another influx and secured by a hawser. This flowing and ebbing was repeated several times. Similar fluxes and refluxes occurred the same evening at Plymouth, the velocity of which was estimated by the master of a vessel then lying there, at eight knots an hour. The barometer at Penzance this evening was at a considerable minimum.

1846, July 5. Exactly three years after that of July 5th, 1843, another extraordinary movement of the sea was observed this day at Marazion, at 4 30 a.m., immediately after a terrific thunder-storm; the tide being about 4 hours ebb. It was noticed at Penzance and Newlyn between 6 and 7 a.m., the rise and fall being between 3 and 4 feet. I regret not having written to Plymouth on this occasion to know if it had been observed there, as I have always found on inquiry that whenever one of these phenomena occurs in different parts of Mount's-bay, another takes place on the same occasion in Plymouth.

The great storm which passed through Britain this day accompanied with heavy rain or hail, raged on the Atlantic in the night of the 4th; much distant lightning from the south and south-west having been then seen in Mount's-bay until between 3 and 4 a.m. of the 5th, when the fierce lightning and thunder burst forth from every part of the heavens. As the storm proceeded towards the east and north-east it grew very alarming and destructive. It reached Exeter between 8 and 9 a.m.—Windsor between 2 and 3 p.m. —and London at 3 30 p.m. In its progress northward,

it was felt throughout Somersetshire between 8 and 10 a.m.—at Leeds about 3 15 p.m.—at Penrith, Dumfries, Ayr, and Glasgow, between 3 30 and 4 p.m.—(the hailstones in different parts of Cumberland being 2, 3, and even 4 inches in circumference—and a very violent whirlwind having preceded the storm at Ayr and Maybole, as well as at Walsall)—at Edinburgh between 5 and 6 p.m.—at Dundee and in Argyleshire about 7 p.m. Thus the storm, in its progress northward, moved much swifter than it did towards the east —as was the case also with the storm of July 5th, 1843.

The temperature this day at Chiswick was 95°, at Boston 90°("the hottest day since 31st July, 1826"), and at Paris 97¼°.

1846, August 1. The sea in Penzance pier at 4 a.m. being very calm and about 5 hours ebb, suddenly rose between 1 and 2 feet, and then retired to its former level, the influx and efflux occupying about 6 minutes. London and its neighbourhood were this afternoon visited with a hail and thunder-storm more destructive than any there since 18th May, 1809. At Lewisham the hailstones "were nearly all as large as pigeons' eggs." It was felt severely the same evening at East Walden, Leicester, and Nottingham, and before midnight at Southampton and Paris. The thermometer in London was 89½° and in Paris 90°. The atmosphere in Cornwall, London, and probably throughout the island, was on this and the two preceding days not only very sultry but highly charged with electricity. In the evening of 29th July, the shock of an earthquake was felt along the Rhine and an awful storm at Whitehaven; and early in the morning of the 30th a thunder-storm with large hailstones visited different parts of Cornwall.

1847, May 23 (Whitsunday). Another great agitation of the sea occurred this morning throughout Mount's-bay, and in Plymouth, Falmouth harbour, and Scilly—noticed in Mount's-bay as early as 5 a.m.,

and continuing all day with varying intensity—the rise and fall being from 3 to 5 feet or more and the sea remaining quite undisturbed except along its margin.[8] The barometer in Mount's-bay at 3 p.m. was at a minimum of 29·67—lower than it had been for some days before, and until 3 p.m. of the following day, when during a storm it descended to a little lower minimum. The thermometer was much higher than it had been for the year, the sun having shone powerfully until about 3 p.m., when the wind which had been S.E. suddenly changed and blew strong from W. or N.W. with every appearance of an approaching thunder-storm. A few large drops fell about 5 p.m. and distant thunder was frequently heard in the evening. Throughout Cornwall, as well as in London and Paris, the thermometer was at a most extraordinary maximum for this time of the year, and the air highly charged with electricity. At Chiswick it was "very hot and sultry," the thermometer being 89° and the barometer 29·780, lower than for seven days before and six days after. In Dumfriesshire there was a thunder-storm. In the night preceding a slight tremor of the earth was felt in Mount's-bay by two coastguardsmen, while standing on the cliff between Newlyn and Mousehole; and "a strange noise as if underground was heard" at Scilly about the time of the oscillation there. This agitation was at its maximum in Mount's-bay about 5 p.m., and in Plymouth between 8 and 9 p.m. and did not cease until the following day, when a much more fearful movement of the sea lasting several hours occurred in the harbour of Callao in South America, where three vessels, anchored near the shore, were in danger of

8 Never before had such a phenomenon been so generally observed here and never had a Whitsuntide more memorable occurred in Mount's-bay—for on the following Thursday during the famine thousands of miners from the neighbouring parishes walked into Penzance, and the military from Falmouth arrived the same morning to preserve the peace.

being lost, and "a furious submarine earthquake was felt by the captain of the American Whale Frigate 'Acushuett,' about 60 miles W.S.W. from the Island of San Lorenzo, at 3 a.m. of the 24th." [9]

1852, November 17. The shock of an earthquake was felt this morning by Messrs. R. V. and E. Davy while shooting on the estate of Newham in Sancreed, west of Penzance, they being at the time a considerable distance from each other. It lasted fifteen or twenty seconds. On the same day a severe shock was felt in the south of Europe at Sagoa in Styria; another shock having been experienced there on the preceding day. On which last mentioned day the barometer at Chiswick was at a minimum of 28·848, lower than it had been since November, 1850. On the same day was a thunder-storm in Lincolnshire, and the rains this month in Great Britain were almost unprecedented.

1855, May 30. About 3 p.m. this day some houses north of St. Mary's Chapel, and adjoining Penzance Harbour, experienced a shock which lasted sixty seconds, and was felt by all within them.

1855, June 6. By an extraordinary oscillation of the sea this afternoon in Penzance harbour, boats drawing 3 feet of water alternately floated and were left dry—the barometer in Mount's-bay being then lower than for ten days before and six days afterwards. No disturbance of the sea was observed elsewhere.

1858, November 11. The earthquake which shook every house in Lisbon this day at 7 15 a.m., and was the most violent experienced there since that of 1755,[10] was felt also 1 mile N.E. of St. Michael's Mount. The spot where it occurred was Tolvaddon mine, on the *floors*, a paved horizontal plot of ground on the surface of the mine. The weather at the time was very gloomy—the wind about south-east, and squally. Capt.

9 British Association, Report for 1850 (Sections), p. 82.

10 *Times* Newspaper of 23rd November, 1858.

Francis Gundry, at 12 20 p.m., being then on the *floors*, a few yards from the 'Count-house, felt the ground tremble for two or three seconds, and after an interval of three or four seconds, the tremor was repeated—both tremors being accompanied with sounds proceeding from the south-west, not unlike the noise of explosions of distant cannons at sea. The motion and noise were experienced also by another person then standing on the same *floors* about forty yards west of the Captain. This earthquake was felt throughout Spain and Portugal, and beneath the Atlantic, and it is very remarkable that an interval of the same number of hours occurred between *each* of the great shocks at Lisbon in 1755, 1761, and 1858, and a shock or agitation of the sea at or near St. Michael's Mount, as particularized in the next three sentences. Four hours and five minutes after the *first great earthquake* at Lisbon (1st November, 1755), an extraordinary agitation of the sea commenced at St. Michael's Mount. Four hours and forty minutes after the *second great earthquake* at Lisbon (31st March, 1761), another such agitation commenced at the Mount. Four hours and fifty minutes after the *third great earthquake* at Lisbon (11th November, 1858), a shock as already mentioned, was felt about a mile from the Mount on Tolvaddon mine. The absolute time on each of these occasions was thus four hours and a fraction after the great shock at Lisbon. The place which suffered most from the earthquake of 1761 and 1858 is St. Ubes, twenty-two miles south-east of Lisbon; and severe shocks were felt at sea many leagues off Capes St. Vincent and Finisterre in 1755, 1761, and 1858—indicating that the centre of disturbance on each occasion was beneath the ocean some distance westward of the coast of Portugal—from about which direction the sounds heard at Tolvaddon seemed to proceed. This last earthquake at Lisbon which lasted half a minute was divided into two shocks, as stated by the *Times'*

own correspondent—and the shock at Tolvaddon likewise consisted of two distinct tremors.[11] These facts are a beautiful illustration of what was stated by Michell a century since; viz.,—that earthquakes "generally come to one and the same place from the same point of the compass, * * * that the velocity with which they proceed is the same," in the same countries.[12]

1859, June 25-26. Very considerable oscillations of the sea occurred this night in all the piers of Mount's-bay, as well as in Falmouth, Fowey, and Plymouth. As I happened to be at Par, 3 miles west of Fowey, a day or two afterwards, I will describe the phenomenon as it occurred there, and as communicated to me on the spot by eyewitnesses. At 11 30 p.m. (Grenwich time), some men on the pier at Par suddenly heard a sound approaching them from the open sea, like the rushing of a first-class steamer, and they thought such a steamer had actually mistaken her course and would in a few seconds be wrecked at their feet. But what they thus, in the darkness of the night, took for a large steamer, proved to be a tremendous current rushing into the harbour, breaking the hawsers by which the vessels were fastened and dashing them against each other. The mouth of the harbour is forty yards wide, opening towards the south-east, and at low-water of ordinary spring tides the sea retires from it to a distance of sixty fathoms, the shore then presenting a plain of sand extending nearly a mile

11 This coincidence coupled with the fact of the sounds proceeding from the S.W., and the remarkable interval of four hours and a fraction between the great shock in Lisbon, and the agitation of the sea at the Mount in 1755 and 1761, justify me in assuming that the shocks in Lisbon and Tolvaddon were both from the same earthquake on 11 November, 1858, although my informants did not remember whether the shock at Tolvaddon was on the 11th or 10th. There was no doubt however on their part as to the time of the day being 12 20 p.m., as that was the Captain's usual dinner-hour, and he was then going to the 'Count-house to dine.

12 Phil. Trans., LI. p. 566.

from N. to S., and more than half a mile from E. to W. The ordinary neap tides rise in Par harbour ten feet, and the ordinary spring tides fourteen. At the time mentioned it was neap tide, and one hour before high-water, yet the mark left by the water along the beach of the harbour close to the Cornwall Railway, as seen the next morning, shewed a rise of fifteen feet, which is one foot higher than the mark reached by ordinary spring tides. Had this happened at high water on a spring tide several hundred tons of valuable copper-ore would have been swept from the pier into the sea. Such was the violence of the current that a schooner, which drew about nine feet of water and would barely float at neap tide, was borne along dragging her deeply-imbedded anchor, until she was left on the mud in the harbour as high as she could have gone at spring tide, and it was necessary a day or two afterwards to take out a great part of her cargo before she could be removed from her strange position. Another schooner after her hawsers had been snapped by the influx, and whilst drifting out with the retiring waters, let go her anchor with twenty fathoms of chain cable; but both anchor and vessel were carried out of the pier with great velocity to the distance of a furlong or two, when the current stayed and the wind (which was south) drifted her on shore. By this influx and efflux, and the others which immediately followed, the ground at the mouth of the harbour was excavated to a depth of four or five feet beyond what had been previously known, and rocks were thereby exposed to view which had never been seen before. The interval between the commencements of two successive influxes was about fifteen minutes. The only place on the northern coast of Cornwall where the disturbance was observed is Bude haven. There it occurred as early as noon when the sea suddenly rose between four and five feet. At Penzance and Mousehole it was noticed in the afternoon as well as at night. The time of its

greatest violence in Penzance at the eastern end of the Esplanade near the battery, was the same as at Par and near the time of high-water. It did not cease at Penzance until the middle of the following day. During its continuance it occasionally renewed its violence.

Thus was the sea on the Cornish coasts extraordinarily agitated from Saturday noon until Sunday noon, during which time a dreadful thunder-storm, attended in some places with violent squalls of wind and heavy rains, was passing throughout the south of England, from its western to its eastern extremity, beginning about noon on Saturday at the Land's-end and reaching London the following morning soon after 7 o'clock, when several persons were struck by the lightning. The barometer on this occasion, as usual, was at a minimum. At the Kew Observatory of the British Association on the 24th and the three following days, the daily mean heights were respectively 30·111, 29·934, 29·890, and 30·132—the wind on the 25th being moderate from about S.E. and S.S.E. The thermometer at the same Observatory on the 25th and 26th was 72·2, and 77·4, the latter being the maximum of the year.

1859, October 4. The extraordinary oscillation of the sea this day in Mount's-bay and the west of England, is more remarkable than any recorded since those on the days of the two great earthquakes of 1755 and 1761, and occasioned no little alarm by rushing up tidal rivers several miles from their mouths. In describing it fully I will begin with the Scilly Isles, then proceed eastward along the southern coast of Cornwall, and return westward by the Bristol Channel.

The following is the tide-guager's report of what occurred at the pier of St. Mary's, Scilly :—" At 7 a.m. there were eleven feet on the tide-guage—it then fell to nine feet making no stop—it began to rise, and in six minutes after there were fourteen feet seven inches

on the guage—it made no stop, but returned back to its old mark with ebbing and flowing in a very disturbed state, William Tonkin, Tide Guage Man." For this I am indebted to Captain Williams, R.N., on the Admiralty Survey. About the time stated in the guager's report, the sea in most of the islands was observed to rise above the high-water mark of the preceding tide, and after retiring, to flow in again to the same height: another efflux and influx immediately succeeded, but less extensive: this, and the state of the weather at Scilly, presently to be noticed, I learnt through the kindness of the President of the Royal Geological Society of Cornwall.

At Mousehole and Newlyn in Mount's-bay, similar agitations were observed between 6 and 7 a.m., which continued for several hours—the interval between two successive influxes being about fifteen minutes, and the greatest rise during one influx being between five and six feet. The boats at their moorings in Guavas Lake, near Newlyn pier, veered with their bows to the current at every change in its direction. The agitation at Newlyn was observed as early as 2 or 3 in the morning, although it was then less considerable than between 6 and 7. Hence probably it occurred unobserved in most parts of the bay long before sunrise.

At Penzance a little before 7 a.m., a current was observed rushing into the pier submerging the large buoys, causing vessels to float which were previously aground, and breaking the moorings of a raft of timber, which the immediately succeeding retiring current carried rapidly out of the pier to a considerable distance. This was followed by a great many similar influxes and effluxes of gradually diminishing violence. Soon after 10 a.m. when the commotion had greatly diminished, I observed by my watch that the interval between the commencements of two successive influxes at the steps nearest the middle alcove was about nine minutes, during which the water rose and fell the

perpendicular height of about two feet. About this time, however, and about an hour and a half after high-water, the bathing-machines near the western end of the Esplanade, which had been left dry many feet from the sea, suddenly floated and were nearly washed away, shewing a rise of between four and five feet.

At Marazion and St. Michael's Mount, the agitation was observed most of the morning and afternoon.

At Porthleven, between 10 and 11 a.m., the sea rushed into the new inner basin to the height of about four feet and then rushed out, occupying in this double movement 10 or 12 minutes. The like phenomenon was noticed in the outer basin for some hours both before and afterwards.

In Falmouth harbour the disturbance must have commenced before daylight—for at 5 50 a.m. (local time) it was observed 8 miles from its mouth at Truro quay, where to the great astonishment of the beholders (says the *West Briton*) "a rush of water was seen rapidly ascending from Malpas three feet in height, which advanced until it reached the head of the river. It was not low-water at the time, but there was no tide on. The 'bore' having reached the head of the river dispersed almost as quickly as it had come. About a quarter to ten, a second rush occurred, but only two feet high, and the water (as in the previous case) immediately subsided." Later in the day when the tide was about $\frac{2}{3}$ ebb a barge left Malpas for Truro, 2 miles distant. On reaching half-way it grounded and remained stationary about twenty minutes, when it again floated by an unusually rapid current, which in a few minutes rose about five feet perpendicularly, and carried the barge up to the railway quay. There the current ceased and the water immediately receded as fast as it had advanced, leaving the boat again aground. A second influx and efflux of equal rapidity succeeded, but the third and fourth influxes did not rise so high as the first two. The intervals

between the successive influxes were about twenty minutes. This information from the barge-men was kindly obtained for me by the master of the steamer *Fal*, which plies between Truro and Falmouth. At 5 15 p.m. another rush of the water up the river caught a heavily laden barge at Malpas and carried it on to Higher Newham, a distance of about a mile. The last that was observed occurred at 6 p.m. but rose only one foot, barely reaching Boscawen bridge on one side and Truro bowling-green on the other.

At Penryn, another creek in Falmouth harbour, between 8 and 9 a.m. the sea rose and fell two or three feet perpendicularly six or eight times in succession carrying the boats to and fro with great impetuosity.

How early in the morning the disturbance was observed at Falmouth I am not aware. At 6 p.m. however, a small steamer then aground waiting at the jetty-head in Falmouth for the ordinary flow of the tide, floated at a most unusually early period, but within half an hour afterwards she was again aground, and soon afterwards again afloat; the gentleman who witnessed this then went on board as a passenger to Truro, but about a mile from that town she was unexpectedly left nearly dry in the river.

At Par and Fowey unusual agitations of the sea were observed on this occasion.

At Looe the agitation, as the harbour-master writes me, was noticed from 8 to 10 a.m.—the latter being the time of high-water. As the sea then rose two feet and a half more than usual, a vessel which had been beneaped, floated and was enabled to leave the harbour.

At Plymouth, in Catwater, this forenoon the extraordinary agitation of the sea was very great.

In Bridgewater this morning "the tide ebbed and flowed three times within a short space. One or two vessels tried to get down the river but the ebb was so quick that they soon got aground."

At Swansea "about 10 a.m. (London time) it being

then near high-water (10 50 a.m.), a reflux of about one foot nine inches occurred, after which the tide again flowed regularly about two feet three inches—there was no appearance of bore. As our beach dries a mile outside our piers, it is not likely that any disturbance after half tide would be observed." This is an extract from the harbour-master's letter.

In Barnstable bay, at Appledore, 2 miles inland, one of the "pilots observed the tide return seven times in succession, the first wave being two feet high, the others gradually diminishing." At Bideford bridge (5 miles inland) the harbour-master informs me it was high-water at noon, and after it had ebbed or receded sixteen or eighteen inches, it rose again to high-water mark, and thus ebbed and flowed several times in the space of an hour accompanied with a strange current. Three miles above the bridge, where the river is much contracted, the phenomenon assumed the form of a wave or bore.

At Bude, "about 9 o'clock in the forenoon, about an hour before high-water (says Mr. Davey), I was standing on the pier-head, when the water rushed up the harbour until there were seven feet and a half of water on the sill of the Lock gates, two feet and a half above high-water mark—it remained for about a minute and then rushed back until there was not water out of the harbour for a boat."

At Padstow, Wadebridge, and little Petherick, all within Padstow harbour, the agitation was very generally remarked. At Padstow the sea rose from three to four feet, and the receding and flowing of the water upon the flood tide were eight or ten times within a short period. 'At Wadebridge, six miles inland from Padstow, there were five or six extraordinary influxes this morning, and barges went down the river from that town after the usual tide had receded nearly midway between it and Padstow.

In St. Ives bay, at Messrs. Harvey's quay, within

the creek of Hayle, a raft of timber was carried up and down a considerable distance several times this morning by the extraordinary alternating current.

In reply to my letters to Kinsale and Havre across our channels I am informed that no unusual disturbance of the sea was observed at either of these places.

About two or three o'clock this morning, when the agitation was first observed at Newlyn, a thunder-storm with very fierce lightning visited Mount's-bay. The thunder and fierce lightning were observed at Scilly three or four hours previously, coming from the S., and about 5 in the morning fierce lightning was seen there towards the N.E. This thunder-storm was not felt near Lundy island in the Bristol Channel until daylight that morning.

The barometer (the daily mean) at the Kew Observatory of the British Association on 3rd October was at a maximum of 30·232, to which it had been continuously rising for the previous six days, that maximum being higher than for twenty-one days before and thirty-six days afterwards: on the 4th it was at a minimum of 29·867, lower than for three days before and two days after. The thermometer on the 4th was at a maximum of 76·3, higher than for forty days before and for the rest of the year. The sun the day before was most unusually scorching in Mount's-bay, and gossamer webs were very abundant in the air.

It is worthy of remark that the 26th of June and the 4th of October, 1859, when the disturbances now described occurred, are more distinguished for their high temperature than any other day of that year.

1859, October 21. The earthquake shock which passed through the greatest part of Cornwall this day about 6 45 p.m. (local time), was slightly felt at Penzance, and at Rosevale, 3 miles N.E. of Penzance. At Falmouth, Truro, and St. Agnes, it was attended with lightning of an unusual character, but without thunder. "At Wheal Ellen, in St. Agnes," says Mr.

Hosking of that mine, "I and my colleague being at the Account house heard a very peculiar rumbling, something like distant thunder. The alarming sensation I experienced was not much unlike that produced on one's nerves by a galvanic battery. The men then underground distinctly felt and heard it—men working thirty and forty fathoms from shaft came from their different places imagining the chain to have broken and the skip to have fallen away—others thought the boilers had exploded. They also felt a peculiar sensation throughout their system." At Redruth it lasted about nine seconds, travelling apparently from S.S.W. to N.N.E. Near St. Austell many thought their houses were falling down, and miners beneath the surface imagined the ground was falling in on them.

The weather in Cornwall and throughout England and Scotland this day underwent an unusually sudden change: piercingly cold winds from the N. and N.W. set in, and in the afternoon and evening were several severe hail-storms in Cornwall. At Perranporth, on the north coast, where the cold was extreme, the hailstones in one of these storms were of extraordinary size. Mr. Lowe, of Highfield House Observatory near Nottingham, records that the 21st was a fine and cloudless day—intense frost—barometer very low [13]—faint red aurora borealis at 6 30 p.m.—lightning at 7 p.m., and the greatest cold during the following night was 23·5,—intense frost killing all half-hardy plants. On the 22nd there was a violent hail-storm in the afternoon and the greatest cold the following night was 22·4, with the severest frost ever recorded in October at the Observatory. This temperature was *lower* than had been ever observed in October, and it is the more remarkable, as the temperature of the 4th of October,

13 The barometer at the Kew Observatory this day was at a minimum of 29·329, lower than for a hundred and one days before and five days after.

when the extraordinary disturbances of the sea occurred, was *greater* than had been ever recorded at the Observatory in the month of October.

1859, December 14 and 15. Remarkable as was 21 October 1859 for the suddenness with which very cold and boisterous weather set in throughout our island, it was not more so than the 14th of December following, when there occurred at Penzance a snow-storm and a remarkable whirlwind (described in chapter 13), and Mr. Lowe of Highfield House says, "The intense frost which set in with a rough N.N.W. wind on the 14th, reached a degree of cold on the 17th and 18th greater than ever recorded here in the month of December since 1841." On the 15th an earthquake-shock was felt at Patelybridge and other places in Yorkshire.

1860, January 13. An earthquake-shock, as smart probably as any in Cornwall hitherto recorded, occurred this day at 10 30 p.m. (local time), not only in Penzance and its neighbourhood but throughout the greatest part of the county—from the Land's-end to Callington, and from the Lizard and Mevagissey to Newquay and Wadebridge.[14] Although its extent scarcely exceeded that of 21st October, 1859, the persons who felt it were probably twenty times as many. Like that shock too it was followed by another about an hour afterwards —in the former case at Truro, in the latter at Liskeard. These second shocks may help to shew why extraordinary agitations of the sea are occasionally renewed before they wholly subside.

Mr. Samuel Higgs, jr., the assistant secretary of the Royal Geological Society of Cornwall, three days after the shock, addressed a printed circular to most of the Mine Agents in Cornwall, requesting to be informed (amongst other things) whether any persons underground at the time felt "any trembling or movement

14 The earthquake of 15th July, 1757, extended from the Scilly Isles, throughout Cornwall, to Plymouth.

of the ground or heard any particular noise," and if so "the direction it came from"—and from the replies received I hoped he would himself have drawn up a report of this earthquake. But as he preferred handing over the letters to me for that purpose, I will here quote all that is important in them, and add such further information as I have obtained from other sources.

In the Land's-end district, at St. Ives Consols Mine, "one of our Agents sitting in the Account house heard a noise like a heavy train passing, and saw a tumbler of water on the table in agitation, and two of our men underground, 130 fathoms from surface, heard a rumbling noise and experienced a trembling sensation, and some of the shipping afloat felt as if they were going aground." At the Providence Mines, in the adjoining parish of Lelant, there was heard at the 75 fathom level (nearly 125 fathoms from the surface) "a noise as though a *kibble* (an iron bucket) had fallen into a shaft, or a *stull* (a wooden platform) had given way, but no motion was felt in the *rock.*" In none of the other Mines of the Land's-end district was any shock felt or sound heard by persons *underground*, whereas on the surface in almost every locality both the shock and the sound were observed, and in some places the shock was very alarming. At Spearne Moor Mine, in St. Just, the Account house "shook so as to cause the things on the mantle-piece to tingle" —"the Account house stands on the *back* of the lode on which the Mine is worked." At Balleswidden the the sound came from the south of east and passed away to the north of west." "At Ding Dong they heard a noise and felt a slight vibration. The weather was thick and hazy with very little wind." At St. Ives some felt their beds to rock and the night was very dark. At Hayle a great many persons who heard the sound concluded that a special Railway train had passed at that unusual hour. The stoker on board H.M. Ship *Bann* a flat bottomed steamer then

aground in the pier of Penzance, informed me that being below deck he felt the ship to shake for six or eight seconds as does a house when a heavy carriage is rolling by it over a paved road—and at the same time he heard the chain cables by which she was secured at her bows making a noise as if they had been dashed up and down upon the rocks on which they were partly lying. In several houses in Penzance glasses struck against each other and in one house the floor vibrated so much that its occupant in terror caught at some support. The chief officer of the Coast Guard in his letter printed in the following *Cornish Telegraph* says that at Mousehole the shock appeared to travel from S. to N. and was felt throughout the town:—those in bed felt as if on board a steamer in a heavy sea. The toilet table at which his daughter was standing appeared as if a person had taken it by one end and shaken it violently, and the various things on it positively appeared to dance. She was much alarmed but could not move as the floor appeared to rise and fall under her feet: directly afterwards was a heavy squall of wind and rain. The shock was particularly violent at St. Michael's Mount, where plaster fell from some of the houses; and at Trengwainton, where earthenware was thrown down: at the former place, the granite protrudes through the slate; at the latter the granite again appears on the surface. In the Scilly Isles no shock was felt nor sound heard.

Eastward of the Land's-end district and throughout the greatest part of Cornwall the tremor and the noise were also very considerable. In Carrick road, in Falmouth harbour, "the master of a barque at anchor was so alarmed by the sudden sharp movement of his vessel that he jumped out of his sleeping-berth to ascertain the cause. The noise was heard generally through Falmouth, and was like that produced by some heavily laden vehicle with more or less intensity

of vibration of windows, china, and glass: some felt their beds rock and one person describes the effect as that of an explosion, an undulating motion being distinctly felt on the ground floor, and the door of an oven which had been left open, being heard to swing to and fro, closing with a sharp noise." At Penryn and Helston the shock was also very alarming. At Ponsanooth some plaster was thrown down from a wall. At Dolcoath Mine the tremor was preceded and followed by a rumbling noise, and miners there heard the sound 260 fathoms beneath the surface. At North Wheal Crofty "men 170 fathoms from surface heard an unusual rumbling noise." At Redruth it was felt underground at various depths from 10 to 190 fathoms, and appeared to proceed from S.E. by E. and to be moving towards the opposite points: many there, and at Mount Hawk in St. Agnes, "were so much alarmed as to leave their beds in a state of bewilderment." In the United Mines, Gwennap, it was felt at the 208 fathoms level. It was also felt underground at Polberro Mine near Par. At Great Busy, Chacewater, says the Agent, "I heard a rumbling noise which I thought to be the Night Agent drawing some of the furniture on the wood floor of the Captains' changing-room. In two seconds I felt the 'Counting house vibrate for ten seconds—after that I thought one of the boilers had burst, but on looking to the engines I found all was right, consequently I supposed it to be the shock of an earthquake, or some awful crush below ground. At the western engine one of the Agents on the boiler-top thought something was wrong with the boilers; my attention was called to them and I found all was right. About thirty minutes afterwards several of the people from that district came to the engine house with every expectation of an explosion having occurred, as the furniture had a most dreadful shake. It appeared to us the sound and

shaking came from the west and lasted ten or twelve seconds."

At Truro it commenced with a loud rumbling noise like that of a heavy wagon over rough pavement: this lasted two or three seconds and was followed by a loud dull thump or shock like a burst of deadened thunder, causing houses to shake and glasses, &c. to dance and jingle in a startling manner: many in bed were so alarmed as to jump out. At St. Dennis, the chairs, the table (with a supper party round it), the plates and dishes on the dresser, trembled, and the bells tinkled—the watch dog began to howl—the sound died away gradually as it came—the night was dark with frequent smart showers—wind from W.S.W. blowing at times in strong and fitful gusts. At Bodmin a person sprang out of bed supposing that the back wall of his house had fallen, and some miners in a neighbouring mine thought the mine was crushing together.

The Agent of Trelawny Mine in Menheniot, near Liskeard, states in reply to Mr. Higgs that nothing unusual was noticed by the miners underground—but in Liskeard and its neighbourhood the shock was very smart. His wife as she lay in bed heard an awful rumble, and the bed-room furniture at once partook of the oscillatory motion. One of the miners says he was literally turned from his side over on his face as he lay in bed. Two others returning from work on hearing the noise thought it proceeded from the Railway train. In the village of Factory two or three pieces of earthenware fell from a dresser. A woman living close to the mine being then in bed thought some one under it was shaking it violently. The shock was felt also in Callington, 8 miles east of Liskeard, and near the eastern boundary of Cornwall. The same letter states that about an hour after this shock, a second shock was felt in the writer's house by his brother whilst sitting reading.

The barometer this day was 30·210 at Penzance, and

30·187 at Kew—being in each case higher than for two days before and two days after. The thermometer the following night was 32·2 at Kew, and lower than for some days before and three days after; whilst at Penzance it was 48·5, and higher than for twelve days before and a hundred days after.[15]

The agitations of the sea now described are very similar to those in Mount's-bay on the days of the great earthquakes of 1755 and 1761, except that in 1755 at the Mount pier (where the sea rose six feet) each influx as well as each efflux occupied about ten minutes; and also except that at Newlyn pier the influx which was observed nearly at the same time as at the Mount and Penzance, "came on like a surge or high crested wave, with a surprising noise."[16] Although Borlase mentions this in his account to the

15 In the midst of the period when these recent extraordinary agitations of the sea and earthquake-shocks occurred in Cornwall, there was on 29th August, 1859, a great magnetic storm "all over the world: not only in the Arctic but in Antarctic regions, in Australia, South America, the West Indies, Bermudas, and elsewhere, auroræ and meteors were unusually prevalent; and they were more remarkable in their features and appearances than had been noticed for many years. There was also an extraordinary disturbance of currents along telegraph wires. Submarine wires were unusually disturbed, and these disturbances were followed within two or three days by great commotions in the atmosphere, or by some remarkable change." (Admiral Fitzroy, Phil. Trans. x. p. 565). "On 1st September following about three quarters of an hour before noon, a moderate but marked magnetic disturbance was recorded at Kew and a storm, a great disturbance, about four hours after midnight: the latter extending to the southern hemisphere. At the very minute when the first disturbance was recorded, two well known English astronomers, each in his own Observatory, were watching the sun's disc, observing his spots, when suddenly two intensely luminous bodies burst into view on the surface. They moved side by side through a space of about 35,000 miles, first increasing in brightness, then fading away and in five minutes they had vanished. It is considered probable that these two observers actually witnessed the process of feeding the sun by the fall of meteoric matter."
(Cornhill Mag. for Nov., 1860, p. 572.)

16 Phil. Trans., XLIX. p 373.

Royal Society, he does not notice it in his subsequently written "Natural History of Cornwall." It is however of importance, as I have been informed by two descendants of an eyewitness, that on this occasion in Lamorna cove, some miles south of Newlyn, the sea rushed to the shore in enormous waves, sweeping along blocks of granite weighing several tons each, and leaving some of them eight or ten feet above the level of spring tides. These with smaller blocks had formed a submarine barrier across the cove, preventing the fine sand from reaching the shore except in very small quantities; but this sand has ever since been deposited on the beach in great abundance.

When an extraordinary agitation of the sea occurs throughout Mount's-bay, a similar occurrence generally (perhaps always) takes place about the same time in Plymouth, and probably also in the intermediate harbours of Falmouth and Fowey. In that of 31st May, 1811, the sea rose on all the southern coasts of Cornwall as well as in Plymouth, from four to eight feet perpendicularly as mentioned in the Royal Cornwall Gazette published seven days afterwards; and Mr. Luke Howard states that at Plymouth it began at 3 a.m., and continued until 10—that at 6 45 the sea rose eleven feet.[17] The following is an extract from the Royal Society's Meteorological Register kept at Somerset House.

31 May, 1811, at 8 30 a.m. bar. 29·47, wind N.N.E., Rain, thunder, & lightning.
" 3 10 p.m. " 29·41, " S. by E., Rain.
1 June, 1811, 8 30 a.m. " 29·69, " S., Cloudy.

A similar phenomenon occurred at Plymouth a few days afterwards on the 8th of June at 4 o'clock, during a severe thunder-storm, as recorded by Mr. Howard—and in the Royal Cornwall Gazette of the 14th of that month it is stated to have been observed also between St. Michael's Mount and Marazion.

The only extraordinary agitation of the sea in

17 Edinburgh Phil. Trans. xv. p. 618.

Mount's-bay during the last century, which I find recorded, besides those on the days of the great earthquakes at Lisbon, is that of 28th July 1761, in Mount's-bay, Falmouth, Fowey, and Plymouth, the sea having at 10 a.m. risen six feet in Mount's-bay. Borlase after describing this, states that there was "thunder at times all the day" and at 8 p.m. the church at Ludgvan of which he was the Rector was struck by lightning.[18] Thus have all the recorded agitations of the sea in Mount's-bay, except those on the days of the two great earthquakes of Lisbon, happened during thunder-storms or minima of the barometer.

All the disturbances of the sea above described were I consider produced by local submarine shocks, without any upheaving, subsidence, dislocation, or fracture of any portion of the submarine ground, as I now proceed to shew.

A shock or vibration passes through wood of different kinds on an average, about 15,000,—through hard slates about 13,000,—through limestone about 7,000,—and through the sea about 4,738 feet, per second; which last is rather more than four times the velocity of sound through the air; therefore, a violent shock from a horizontal portion of the basin of the sea proceeding upwards vertically, would on striking the bottom of a floating ship, cause her to rise many inches above her water-line: after which she would fall just as much below it; and thus continue rising and falling until the equilibrium be restored. If loose pieces of timber or anchors were lying on the deck the shock would be transmitted to them, and they would be jerked up to heights proportioned to the violence of the shock. On one occasion, forty leagues west of St. Vincent, the men were thrown "a foot and a half

[18] Phil. Trans., LII. p. 507.

perpendicularly up from the deck."[19] If the shock instead of proceeding from a spot at the bottom of the sea parallel with the horizon, were to proceed from the inclined plane of the shore, it would reach the ship obliquely, with sufficient power suddenly to arrest her progress if sailing towards the shore, and to make all on board suppose she had struck on a rock. Let us apply these facts to the subject before us.

At the mouth of Penzance pier the depth at low-water is one fathom, which gradually increases towards the S.E. and S.S.E. (the most open part of Mount's-bay), until at the distance of about 1 mile it becomes ten fathoms, as I find by the chart published by the Admiralty in December 1854. Now if a portion of the bed of the sea extending a mile outside Penzance harbour towards the S.E. and S.S.E. were to receive a violent shock vertically from the interior of the earth, a surface of sea of equal extent would be instantly dashed with great velocity towards the S.E. and S.S.E., and if the shocks were repeated ten times a second for ten or twenty seconds (as is common in earthquakes, whether on dry land or under the sea[20]) a considerable quantity of water would be driven seaward. To replace this, the water would flow rapidly from the N.W. and N.N.W. and thus the harbour of Penzance would be drained. The reaction follows—the reflux being from the S.E. and S.S.E. *(as was actually the case there on the day of the great earthquake at Lisbon*[21]*)*—the alternating current continuing until the equilibrium be restored.

[19] Lyell's Geology, II. p. 241, 3rd edition. During the earthquake in Calabria in 1783, the violence of the movement of the ground was singularly illustrated by the bounding into the air, to the height of several yards, of masses slightly adhering to the surface. In some towns, a great part of the pavement stones were thrown up, and found lying with their lower sides uppermost (p. 214). See Brit. Assoc. Report for 1850, p. 37, for other examples.

[20] This rapid succession of shocks is felt on shipboard like the tremor produced by letting go the anchor in deep water.

[21] Phil. Trans., XLIX. p. 373.

That this explanation may be clearly understood, I will apply it, in other words, to the disturbance at Par harbour (page 86).

Assuming that a considerable portion of the inclined bed of the sea outside Par harbour experienced a vertical shock or rapid succession of vibrations lasting for ten or twenty seconds, a large body of water resting on that bed would by the successive vibrations be driven seaward, as will appear by the following illustration. If a smart blow be given to the lower end of an inclined tube filled with marbles all the marbles would receive the blow, but only one or two at the upper end would fly off, the rest merely transmitting the blow and remaining stationary. A second blow would drive off one or two more of the marbles, and so on until the tube be almost emptied. So a blow or single vibration from the submarine ground inclining seaward, would pass through the water four times faster than sound through air, and the surface only of the water would be dashed off, the rest merely transmitting the blow and remaining stationary. A second blow or vibration would drive off a fresh surface of the water, and if the vibrations be repeated ten times in a second for ten or twenty seconds, the fresh surfaces thus driven off would form an extensive current flowing seaward and thus occasion the efflux with which this phenomenon generally begins.[22] As soon as the momentum of this efflux is exhausted the reaction commences, and the water that had been flowing seaward, now flows back to recover its level. This flowing back, most probably, occasioned the sudden rise in Par harbour; the subsequent ebbings and flowings being merely like the oscillations of a pendulum, which continue until the motion originally imparted be exhausted. If the agitation be of long

22 If the first movement be an influx, which I believe is very rarely the case, it may be accounted for by supposing that some neighbouring submarine rocks or shoals with sides sloping towards the shore had received a vertical shock.

continuance with an occasional renewal of intensity it may be owing to a repetition of the submarine shocks, for shocks at sea as well as on land frequently come in groups.

It is commonly supposed that these agitations on our coasts are the mere effects of corresponding agitations many miles or leagues off at sea (ante, p. 76). But although there may be, and doubtless often are, at the same time, similar disturbances far off at sea, yet all of them, whether far off or on our shores, are, I believe, perfectly independent of one another, and no portion of the disturbed waters extends more than a few furlongs from that particular part of the bed of the sea over or near which it had rested previous to its agitation. An exception, however, must be made where the sea flows far inland. But the recent extraordinary currents in Falmouth harbour do not appear to have been occasioned by any disturbance outside in the open sea; and there is inside, at most times of the tide, sufficient water in case of an earthquake-shock, to fill for a few minutes, all its creeks. Had any current been observed flowing in or out of the harbour's mouth it would have originated most probably from the inside—for the submarine ground inclining seaward, whether in the creeks or in the mouth of the harbour, would on receiving a vertical shock drive the waters resting on it seaward; while the sloping submarine sides of the creeks and of the harbour's mouth would drive the waters resting on them, at right angles to that direction. That such agitations *within* harbours or creeks are not necessarily connected with agitations *without*, is proved by what occurred in the river at Swansea, on the day of the great earthquake of Lisbon, in 1755. About a mile up this river, and at about two hours ebb of the tide "a great head of water rushed up with a great noise, floated two large vessels, the least above two hundred tons (one whereof was almost dry before), broke their moorings and hove them across the river.

* * * The whole did not last ten minutes, the rise and fall: and, what is most remarkable, it was not felt in any other part of the river; * * * for near the town and mouth of the river is a passage boat, that was passing at that time and had been for the whole day * * * and there nothing was felt of it."[23]

It may appear to some highly improbable that submarine shocks should occur so extensively on the south and north coasts of Cornwall without any shock being felt on the intermediate dry land. But Humboldt observes that in Chili, Peru, and Terra Firma, the shocks follow the course of the shore—the lowest part of the land—and extend but little inland; and "in the mines of Saxony we have seen" says he "workmen hasten up affrighted by oscillations not felt on the surface."[24] So in England on the day of the great earthquake of 1755, whilst only one shock was perceived on the surface of the mines in Derbyshire Peak, five smart shocks were felt there sixty fathoms underground, between 11 and 11 20 a.m.,[25] and on the same occasion ponds were violently agitated without any perceptible shock in their neighbourhoods. Moreover, ducks and geese in ponds have often rushed suddenly from the waters immediately before an earthquake. Mr. Mallet asks whether the reason of this may not be "that with their heads immersed they are able to hear the first distant mutterings, while yet inaudible through the air."[26] But how can this be when sounds do not travel through the earth faster than shocks? It is true that earthquake sounds are often heard immediately before shocks are felt—but such sounds must have been produced, not by the shocks which were afterwards felt, but by preceding shocks or vibrations which were not felt at all. The successive rapid vibrations con-

23 Phil. Trans., XLIX. p. 379.

24 Personal Narrative, II. pp. 222 224.

25 Phil. Trans., XLIX. p. 398.

26 Brit. Association Report for 1850, p. 68.

stituting a shock vary considerably in power, so that the weaker ones if they came first and reached no higher than the bottom of the pond might have alarmed the birds before the stronger ones were felt on its banks.

On the other hand some may consider it equally strange that when an earthquake-shock is felt throughout Cornwall it is not generally accompanied with extraordinary agitations of the sea on the Cornish coasts. The explanation is that such agitations of the sea are usually produced by *vertical* submarine earth-shocks, whilst shocks felt on dry land are generally ***horizontal*** or nearly so.

Here I may suggest a reason why, during the oscillation in Mount's-bay, in 1755, recorded by Borlase, the sea rose not less than ten feet in Newlyn pier, whilst in Penzance harbour, 1 mile N.E. of it, it rose only eight feet. The shore extending southward from Newlyn forms part of the western arm of the bay, and the depth of the sea increases so rapidly from this shore, that within the distance of half-a-mile it is not less than ten fathoms at low water. Now, if a submarine shock occurred all over the bay, the current proceeding from this western arm would soon join that proceeding from the northern part of the bay near Newlyn, and these two currents to the E. and S., uniting at right angles, would then proceed in the diagonal of the parallelogram representing their forces, which, if equal, would be towards the S.E., and the united current in returning would flow towards the N.W. that is, towards Newlyn pier, with greater velocity than either of them possessed before their union. Hence, in the anchorage outside Newlyn pier, the alternating current on 1st November, 1755, moved, even "in the decline of the commotion, at the rate of seven miles in an hour," as ascertained by the log of a vessel then anchored there.

If my hypothesis be well founded, the waters of inland lakes must be acted on similarly to those on the

sea-coasts. Submitting it to this test, let us suppose that on the day of the great earthquake in Lisbon, there were shocks in most parts of Great Britain: for although Mr. Mallet mentions only Eyam Edge in Derbyshire Peak and two places near Reading, where shocks were actually felt in this island, there is traditional evidence of shocks having occurred in Cornwall. The late Rev. Canon Rogers stated at the annual meeting in 1855 of the Royal Geological Society of Cornwall, that one of his ancestors at Helston heard the sound accompanying the shock there, which resembled that of a carriage passing. And Troutbeck in his account of Scilly (1794), gives a description of the shock as felt in those isles, where "several people ran out of their houses for fear they would fall upon them" (p. 40). Most probably shocks were then felt also in other parts of Britain without any record being kept of them; and whilst five smart shocks within twenty minutes were felt underground in Derbyshire Peak, as already stated, only one was perceived at the surface. Assuming therefore that shocks occurred on that day in most parts of Britain on its submarine coasts, and the beds of its lakes, and that their direction was vertical, the effect on each of its lakes would be to drive the waters resting on its inclined shores towards its centre: hence the waters of Lockness "swelled up like a mountain;"[27] by which expression I understand that the waters resting on its inclined shores were by the vibrations of the shock driven towards its centre, and there accumulated to an astonishing height. A similar phenomenon was witnessed in Lake Ontario on 20th September, 1845, when, during a tornado and thunder-storm with waterspouts and large hail, the waters suddenly moved "in a mass out of the rivers, bays, coves, harbours, &c.," to a depth of two feet,

27 This was said of its agitation during the great earthquake of 1761, and was probably equally descriptive of its agitation during the earthquake of 1755.

and then returned to an equal height above their previous level. As this happened on both sides of the lake, a great elevation must have been thus produced at or near its centre, as was the case at Lockness. There was another similar occurrence on 5th June, 1858, in the English channel—the sea on the French and English coasts first retiring suddenly and then returning with great violence to a much higher level.[28]

The effect in the bed of a canal would be not only to drive the water from its sides towards the centre, where it would rise into a long ridge, but also to drive the water from its higher towards its lower end. This latter when its momentum ceased would flow back to the higher end, where rising (as it probably would) to a higher level than it had before, it would dam back any stream gently entering there. All this was exemplified in the Surrey canal on the day of the great earthquake of Lisbon. That canal was 700 feet long and 58 broad. "The water at its higher end usually pens from two to four feet, growing gradually deeper to the west end, where it pens to about ten feet." At and near the higher (eastern) end the ridge of water raised in the centre was about ninety feet long, and between two and three feet above the usual level: this ridge heeled northward and flowed over the walk on the north side of the canal: on the water's returning into the canal, another such ridge was raised in the

28 "Extraordinary Phenomenon at Boulogne.—A letter from Boulogne-sur-mer on Saturday last says:—"An extraordinary phenomenon, considered volcanic, occurred here this morning at 8 o'clock. The tide which was receding, suddenly fell and left the harbour dry, but returned in five minutes with great force eight feet higher, accompanied with a perfect tornado of wind, and the sky densely obscured. The whole did not last more than ten minutes, but what was most strange, was, that there existed the brightest sunshine immediately before and after.—P.S. The passengers of the Folkestone boat, who have just come in (half-past five p.m.), report that a similar occurrence took place there and at other places on the English coast at the same time as here." (Illustrated London News of 12th June, 1858, p. 575.)

middle which heeled southward, and flowed over the walk on the south side. During this second oscillation the small stream at the higher end which constantly flowed through the canal was driven back thirty-six feet towards its source. This was considered [29] as the *effect of this second oscillation:* but *no oscillation from side to side* could have increased the depth at the higher end where the stream entered. It was, most probably, the second *oscillation from end to end* that dammed back the stream, for *it* must then have reached the higher end of the canal and deepened the water there. The *oscillations from end to end* no doubt escaped observation on account of the tenfold more striking oscillations *from side to side.*

The irregularities observed in the motion of the waters during those agitations may arise principally from the inequalities, obstructions, and different degrees of elasticity or shock-transmitting power in the submarine ground. Frequently, too, subsequent shocks must interfere with the effects of preceding ones, and thus sometimes occasion those "mountainous breakers" mentioned by Darwin,[30] and observed also at La-Morna as already stated.

Much light might be thrown on this interesting subject by future observers were they to ascertain—

1. Whether these disturbances commence generally with an efflux or an influx.

2. Whether, when they have in one locality begun with an efflux, they ever in the same locality begin with an influx—and *vice versa.*

3. At what places they *have*, and what places they have *not*, occurred on a particular occasion, and

29 Phil. Trans. XLIX. p. 354.

30 Journal of Researches, p. 378. Mr. Mallet calls these "the great sea wave," which (as he considers) rolls "in from the offing" and results from a distant disturbance of the bottom of the sea. Brit. Assoc. Report for 1850, p. 47.

whether on different occasions the places of their occurrence or non-occurrence are the same.

4. Whether the submarine ground over and near which they occur, or do not occur, be level or inclined, and if inclined, in what directions and at what angles.

5. The directions, length, breadth, and rapidity of the currents, the times occupied by each advance and by each retreat, and the time between the commencements of two successive effluxes or influxes.

6. Whether in the mouths of landlocked harbours, like those of Falmouth or Fowey, there is any current flowing alternately out and in, or from the sides towards the centre and back, or in all these directions, during the agitation within the harbour.

7. The times and states of the tides at the commencement, greatest violence, and termination of the phenomenon at each particular place.

8. The state of the atmosphere, whether calm or stormy, or lightning, the direction of the wind, and the states of the barometer, thermometer, and other meteorological instruments, together with their states some days before and afterwards.

9. Whether any earthquake-shock occurred at or about the time in the neighbourhood or elsewhere.

CHAPTER XI.

REMARKABLE FACTS CONNECTED WITH EARTHQUAKES.

CONTEMPORANEOUS earthquakes or extraordinary agitations of the sea, even when thousands of miles apart, are often connected with each other. No one denies the connexion between those in Europe and America on 1st November, 1755. On the 18th of the same month, there were again earthquakes and extraordinary agitations of the sea in Europe and America.[1] On both days shocks were felt on the Atlantic. On the *former day* the weather was remarkably fine in most parts of Europe, the barometer in Dublin during the preceding night being at a maximum unusually high, and in Mount's-bay *higher than* Borlase had "noted it for *three years.*" In the night preceding the *latter day* the barometer at Dublin was *lower than* it had been for *three years*, as I find from a meteorological register in the Philosophical Transactions.[2] *Thus immediately after the turns of an atmospherical wave, the crest of which was unusually high and the trough unusually low, two of the most terrible and extensive earthquakes on record occurred.*

So again in the afternoon of 11th January, 1848, when a dreadful earthquake occurred in Sicily and Malta, by which the city of Augusta was laid in ruins and its mole subsided to a depth of more than

[1] Brit. Assoc. Report for 1852, p. 173.

[2] XLIX. p. 794. This register includes only the 3 years 1753—1755, the lowest minimum being during the night of 17th November, 1755, when it descended to 28·32 which it did not probably reach again for years afterwards. The maximum at Dublin (the highest in 1755, except in January that year) occurred during the night of 31st October, 1755.

fifty fathoms, the barometer at Chiswick was 30·461 —higher than for months before and for the rest of the year: and at midnight preceding the 11th of February, exactly a month afterwards, when a very destructive earthquake was experienced in Morocco accompanied with a violent hurricane, the barometer at Greenwich was at the most unusual minimum of 28·598.[3] *Here again at the turns, or maximum and minimum, of an atmospheric wave of unusual height and depth, two terrible earthquakes occurred.*

Oftentimes an earthquake is felt in one locality whilst at a distance of some hundreds or perhaps thousands of miles, a hurricane or other remarkable state of the atmosphere contemporaneously occurs. On 18th Oct., 1844, when a very destructive earthquake happened at 10 30 p.m., during a profound calm, at Salta and other provinces in South America, over an extent of territory above 1000 miles long from N. to S. and several hundred miles wide, the town of Buffalo on Lake Erie was almost destroyed by a hurricane.[4] So also on 9th February, 1861, when a severe shock was felt at Malta, at 0 37 p.m., which lasted nearly a minute (the motion being horizontal attended with a loud rumbling and also a crackling noise—the wind from S.S.E.), one of the most destructive storms of wind ever known in this country, and severer than that in which the *Royal*

[3] Exactly one year after this unusual minimum, the barometer, at Penzance in the morning of 11th February, 1849, was at the almost unprecedented maximum of 30·90—and this occurred whilst the wind was S.W. At the Observatory in Whitehaven, ninety feet above the sea level, the barometer this day was 30·82. At the Greenwich Observatory, forty feet above the sea, the maximum was 30·85—greater than any reading since January 1825, when the barometer at the Royal Society's apartments attained 30·841, at eighty-one feet above the sea. And there is no other instance recorded in the Philosophical Transactions of a reading so high as 30·8 from 1774. The maxima on this 11th February, 1849, in various parts of the country, were all 30·90 at the mean sea level. (Edinb. New Phil. Journal for July, 1850, p. 57.

[4] Brit. Assoc. Report for 1850 (Sections), p. 82.

Charter was wrecked, visited the eastern coasts of England and Ireland: and in the preceding afternoon and night more rain fell in this district in fifteen hours than had ever been known here, accompanied with a fearful tempest from about N.E. Again, in the evening of 29th July, 1848, when an earthquake was felt along the Rhine, an awful storm raged at Whitehaven; and early the following morning a thunderstorm with large hailstones visited different parts of Cornwall.

The following examples of the like nature are interesting from their association with the last two earthquakes in London. In the night of 5—6 Feb., 1850, when an eruption of Vesuvius commenced more tremendous than had occurred for many years, a fearful hurricane from W. and N.W., accompanied with thunder and lightning, swept over our island, blowing away the unfinished lighthouse on the Bishop rock in Scilly, rooting up trees, and overturning chimney stacks and even houses in London. *These phenomena were almost exactly a century after the earthquake in London* on 8th February, 1750: on which day there was also an earthquake in Rome, and who knows but that *the eruption of Vesuvius on 6th February, 1850, when such a hurricane visited London, may have been the opening of the safety-valve by which London and Rome were saved from another earthquake?* Exactly one month before the earthquakes in Rome and London of 8th February, 1750, an earthquake had been felt in Rome on 8th January:[5] and as there was another earthquake in London on 8th March, 1750, these three successive earthquakes of 8th January, 8th February, and 8th March, 1750, may have led to the earthquake panic of 8th April following, when hundreds of thousands of the citizens expecting to be visited that night by another earthquake "left their houses and walked into the fields or lay in boats (or carriages)

6 Boyle's Chronologist.

all night."[7] On 6th March, 1850, (exactly one month after the eruption of Vesuvius and storm in London of 6th February, 1850—and after the same number of days as between the last two earthquakes in London), the barometer in Mount's-bay reached the very unusual maximum of 30·73, higher than it had been since that day twelvemonth when it was at a maximum of 30·75. This was almost precisely 100 years after the last earthquake in London—and we have already seen that very extensive earthquakes have immediately followed very great maxima of the barometer.

The next four examples are connected with the hygrometer. Each of the two great earthquakes throughout Mexico on 9th March and 7th April, 1845, was as extensive as the great earthquake of Lisbon. On the day when the former occurred a smart shock was felt at Campsie, near Glasgow, and it was the *driest day* of the month in Cornwall, and "cold and dry" at Chiswick. When the latter happened (it being severer than any in Mexico for more than a century before) a shock was felt on board H.M. ship Viper 5000 miles from Mexico, within one degree of the equator, in longitude W. 27·17, and the air this day in Cornwall and Chiswick was most *unusually dry*. On 3rd June, 1827, when a slight shock was felt in Martinique, the first rain fell after a drought of sixty-six days—no other such dry weather in the West Indies having been remembered. And on 4th May, 1833, there was again a slight shock in the West Indies preceded by a great drought.

Auroras and meteors very commonly accompany earthquakes. The shock at Liskeard in Cornwall on 24th February, 1759, at 10 p.m., was accompanied with "blood red rays which converged from all parts of the heavens to one dark point and disappeared in

7 Gent. Mag., 1750, p. 84. But no mention is there made of the earthquake at Rome on 8th January, 1750.

fifteen minutes."[8] A very brilliant aurora attended the great earthquake in New Zealand on 19th October, 1848, "which began in a gale of wind." On the same day a shock was felt in England, at Sandwich, at 7 a.m., after a most unusually tempestuous day with thunder and hail-showers along the southern coasts of England, followed at night by a bright scarlet aurora seen throughout Britain—and greatly disturbing the magnetic instruments at the Greenwich Observatory, so that this magnetic storm and aurora may have extended from England to New Zealand.

Extraordinary agitations of the sea, when unaccompanied with known earthquakes, are generally, perhaps always, attended with "gales of wind or thunder and lightning and a depressed barometer:"[9] and I have already stated that all those recorded in Cornwall have been thus attended (p. 102).

Earthquakes, too, are often accompanied with similar states of the atmosphere. Thus, on 10th November, 1782, the barometer in Scotland, when Loch Rannoch was violently agitated by a subaqueous shock, sank to within one-tenth of the bottom of the scale. A slight shock was felt at Mayence,[10] on 25th December, 1821, during an extraordinary depression of the barometer throughout Europe. *Before* the earthquake in Belgium on 23rd February, 1828, there was a very great fall of the barometer through the whole of Germany and even further: it rose however *during* the shock: on the 22nd of the following month *on the repeated shock* there was a much more widely spread low position of the mercury.[11] The morning of Good Friday, 2nd April, 1858, was remarkably rainy and boisterous in Cornwall, and on the day preceding an earthquake was felt at Plymouth and in Liskeard. The shock in

8 Gent. Mag., 1759, p. 143.

9 Edinb. Phil. Trans. xv. p. 621.

10 Edin. Phil. Journal., October 1841, pp. 295, 296.

11 Brit. Assoc. Report for 1850, p. 69.

Cornwall on 21st October, 1859, and that in Yorkshire on 15th December, 1859, occurred at the sudden commencements of periods of most unusually inclement weather throughout this island.[12] During the hurricane in the West Indies on 21st August, 1848, there was an earthquake at the time of the fiercest lightning. Immediately before the great earthquake in the evening of 20th March 1861, in South America and far off in the Atlantic as well N. as S. of the line, there was "a remarkable storm and a hot rain which drove the inhabitants (of Mendoza) into their dwellings for shelter," and thus increased the number of those who perished in that town: and the barometer at Kew this day and two days before and two days after was most remarkably fluctuating. The first earthquake felt by Humboldt at Cumana was during a severe thunder-storm, on 4th November, 1799—"at the moment of the strongest electric explosion were two considerable shocks of an earthquake" [13]—but the barometer which had been previously falling continued to fall for five hours afterwards, when a third and last shock occurred, at which "moment the mercury was precisely at its minimum height." [14] This is analogous to what occurs during storms—for when the barometer continues to fall after a storm has apparently passed we expect a very speedy recurrence of it.

But it is generally considered that earthquakes take place equally in all states of the atmosphere. If so, it is important to ascertain why such earthquakes as are known only by the extraordinary agitations of the sea

12 Ante p. 95.

13 Compare this with the electrical phenomenon near Cape Cornwall, described in chapter 13.

14 Personal Nar., III. pp. 316—319. In the "*Bulletin de la Societé Geologique de France*," 2nd series, III. (April 1856), p. 466, there is a paper by M. A. Boué entitled "*Parallèle des tremblements de terre des aurores boréales et du magnetisme terrestre*" *&c.*, wherein he considers that the *fluide magnétique* has much to do both directly and indirectly in producing earthquakes.

which they produce, should occur *exclusively* during storms or at or near minima of the barometer. Is it because these submarine shocks (as already stated p. 107) are always vertical while those on dry land are generally horizontal? In *vertical* shocks there may be electrical discharges between the earth and the atmosphere which might occasion the attendant minima of the barometer, as in the case now quoted from Humboldt, where the minimum was not reached until the third and last shock—whilst in *horizontal* shocks the discharges may be only between differently charged portions of the earth without much affecting the atmosphere.

CHAPTER XII.

PERIODICITIES IN EARTHQUAKES AND REMARKABLE STATES OF THE ATMOSPHERE.

HUMBOLDT during the above-mentioned thunder-storm in Cumana at 4 p.m. of 4th November, 1799, felt an earthquake simultaneously with the strongest electrical explosion. "On the following day there was a violent gust of wind attended by thunder and a few drops of rain. No shock was felt. The wind and storm returned for five or six days, at the same hour, almost at the same minute. The inhabitants of Cumana and of many other places between the tropics have long ago made the observation that those atmospherical changes which appear the most accidental follow for whole weeks a certain type with astonishing regularity. The same phenomenon exists in summer under the temperate zone; nor has it escaped the sagacity of astronomers who often see clouds form in a serene sky during three or four days together in the same part of the firmament, take the same direction and dissolve at the same height —sometimes before sometimes after the passage of a star over the meridian—consequently within a few minutes of the same point of apparent time. M. Arago and I paid great attention to this phenomenon in the years 1809 and 1810 at the Observatory of Paris." [1]

These are series of storms and atmospherical changes recurring at successive complete rotations of the earth on its axis; coincident with one of which storms and with the strongest electrical explosion was an earthquake.

[1] Personal Narrative, III. pp. 316, 319.

The following are series of storms and considerable atmospherical changes recurring at successive complete revolutions of the moon round the earth, coincident with some of which phenomena are earthquakes or extraordinary agitations of the sea. All the days written in italics are nearer the moon's first quarter than to the new, full, or last quarter. The first series of six remarkable days begins with a most unusual minimum of the barometer—the lowest for more than five years.

1844, *February* 26. Barometer at Penzance this day 28·50, having fallen nearly two inches in thirty-six hours. The minimum at Chiswick was 28·624—lower than for 409 days before and for exactly four years after, when on 26th February, 1848, it was 28·452.

1844, *March* 29. Barometer at Chiswick at the unusual maximum of 30·505—higher than for 188 days before and 573 days after.

1844, *April* 25, *May* 25, *June* 23. These three months were in England the driest probably since 1785—and the three driest days of these months in Cornwall were those now mentioned—each being the very day of the moon's first quarter.[2] Although the atmosphere at 1 p.m. on the 23*rd June* was drier than on any other day of that month, and though there was at that hour no appearance of approaching rain, yet in the early part of the evening the whole county was visited with a dreadful thunder-storm and torrents of rain after a most unusually long continuance of dry weather.[3] The thermometer at Chiswick this day was 91,° the maximum for the year except the day next mentioned.

2 The driest day of these three months was 25*th May*, when the temperature was 71° "and the dew point 34° indicating 37 degrees of dryness which is the greatest we ever witnessed in the open air." (Monthly Agricultural Report for Cornwall, published in the *West Briton*. The observations were made at Pencarrow, nearBodmin).

3 Agriculturalists say that an *excessive dryness of the air is usually followed by rain within a few hours.*

1844, *July* 25. Thermometer at Chiswick 91°, the maximum for the year.

1845, March 9 and April 7. The great earthquakes and the states of the atmosphere on these days are noticed on page 115.

1845, *October* 8. This is the last of a series of ten remarkable days (presently to be mentioned), occurring at or near the moon's first quarter, at intervals of four lunations each. At noon this day, within half-an-hour after the moon's first quarter, the barometer at Penzance near the close of a very violent storm of wind and rain from S.S.W. reached a minimum of 28·75, lower than for at least six months before and 103 days after. The minimum at the Greenwich Observatory was 29·091, and occurred at 9 35 p.m., the wind being S. by W. On 6*th November*, exactly one lunation afterwards, the barometer at Penzance was at nearly the same minimum [4] on the termination of another violent storm of wind and rain from about S., and on the following day it rained very heavily with thunder and lightning.

In the preceding year, and almost on the same days of the year, occurred two minima still more remarkable, and with the like interval of one lunation between them. The days were 9th October and 8th November, 1844, on the former of which was a tremendous hurricane at Penzance from S. and S.W., the barometer

[4] On 23 October, 1845, (the half lunation between the minima of 8 *October* and 6 *November*), the barometer attained the unusual maximum at Penzance and Chiswick of above 30·50: and the barometrical wave, one inch and three quarters high, whose rise and fall thus occupied the entire lunation from 8 October to 6 November, 1845, was for its height, amplitude, and continuous ascent and descent, the finest I have ever observed.

Much has been written in the British Association Reports about "the great symmetrical barometrical wave of November." It began in 1845 (immediately after the wave now described) "near midnight between the 6th and 7th of November, culminated on the 14th and terminated on the 21st."

Brit. Assoc. Report for 1846, p. 125. Ibid (Sections), p. 36.

at Chiswick on that day being 29·025,[5] but on the latter day it sunk to 28·937. These minima were lower than any for above a year and half previously except that on the 26th February, 1844, already mentioned.

1846, *July* 30. Early this morning Cornwall was visited with a thunder-storm and large hailstones: on the evening before were an earthquake on the Rhine and an awful storm at Whitehaven.

1846, *August* 27. This evening were a thunder-storm with heavy rain in Mount's-bay, a luminous arch in the sky seen from Dundee, and an earthquake at Leghorn.

1846, *September* 27. Another thunder-storm at Penzance with fierce lightning and heavy rain.

1846, *October* 27. The finest day of the month in Mount's-bay, calm and splendid weather.

1846, *November* 27. The finest day of the month —frost in the morning—very calm with a scorching sun and an unusual looming of distant objects in Mount's-bay—gossamer webs very abundant.

1846, *December* 27. Barometer higher than for 290 days before and 64 days after—a calm, frosty and most unusually clear day. The Lizard, seventeen miles from Penzance, seemed no more than three, the looming being greater than ever before observed by living persons. At Newlyn "the sea on the eastern side of the Lizard was visible,"[6] notwithstanding the intervening land.

Of these six days the first three are distinguished by thunder-storms and the last three were the most calm and splended days of the months. During this series there was on 25 *November*, 1846, a very smart shock of an earthquake at Perth, Dundee, and other places

5 See Redfield on Hurricanes, p. 67, where the effects of this hurricane at other places are mentioned, particularly in Dublin and on the western and eastern coasts of England.

6 Penzance Gazette of 30th December, 1846.

in Scotland: and on 23 *December* (nearly one lunation afterwards) the barometer at Chiswick was 28·620, lower than it had been since the great hurricane of 13th January, 1843, when it fell to 28·181.

1848, *January* 11, *February* 11. The earthquakes and states of the barometer on these days have been already noticed (page 113), the barometer on the latter day being at a most unusual minimum.

1848, *March* 12. Barometer at Chiswick 28·697, lower than for eleven days before and for the rest of the year[7] —a thunder-storm in Mount's-bay. On the 10*th* this district was visited by a very dreadful thunder-storm—Morvah church and some houses in St. Levan, and two men in a mine in Gulval fourteen fathoms beneath the surface, being struck by lightning.

1848, *April* 10. Barometer at Chiswick 29·328, lower than for twenty days before and eight days after —hail-showers in Mount's-bay, and a thunder-storm in the north of Cornwall, when Cubert church was struck by lightning.

1848, *May* 11. Thermometer at Chiswick 84°, *higher than for many months before and fifty days after*, except 15th May *(four days after)*, *when it reached* 91°.

A remarkable parallelism with this happened almost exactly twelve lunations before, on 23*rd May*, 1847, when the agitations of the sea in Cornwall and Callao occurred. The thermometer at Chiswick was then 89°, *higher than for many months before and fifty days after*, except 28th May *(five days after)*, *when it reached* 91°.

1848, October 18. A splendid aurora seen throughout Britain this night, followed the next morning by earthquakes in England and New Zealand (p. 116).

7 On 26 February, 1848, at the half-lunation between the two great minima of 10 *February* and 12 *March*, the minimum was still more extraordinary, being 28·452; and a terrific hurricane occurred in Mount's-bay, Fowey, and other places.

1848, November 17. A still more splendid aurora seen not only in Britain, Madrid, and other parts of Europe, but also in North America at Montreal, where whilst the coruscations were brightest a slight rustling noise similar to that emitted by flames of fire was said to have been heard.

Two other most splendid auroras (having like these an interval of exactly a lunation between them) occurred in the preceding year, and about the same time of the year. That of 24th September, 1847, was seen in Cornwall, Greenwich, &c., at which last place "during the whole of the day the magnetic instruments were very much disturbed." That of 24th Oct., 1847, was seen not only in England but in Madrid and other places. At Greenwich "the horizontal force magnet was in a position never before reached since the establishment of the Magnetic Observatory."

1850, February 5—6 and March 6. The hurricane on the former day and the great maximum of the barometer on the latter are noticed in connection with the last two earthquake-shocks in London on page 115.

1859, *October* 4. Extraordinary oscillations of the sea in Cornwall described on page 88.

1859, *November* 3. Barometer at Kew 28·774, the minimum for the year.

1860, August 5. Earthquake felt at sea on board the *Progress*, Captain Warre, in lat. 1·11 N. and long. 28·40—St. Paul's rock being 43 miles W.

1860, September 3. Shock at Wrotham, Seven Oaks, Maidstone, Tunbridge, and other places in Kent, at 3 30 p.m.[8]

1860, October 3. One year after the last disturbance of the sea in Cornwall one of the most terrific storms ever felt commenced, occasioning great destruction of ships, especially in the Baltic. Captain Otter, of H.M. steamer *Porcupine*, then off St. Kilda, one of the Hebrides, reports that his "Kew Verified"

[8] Athenæum for September, 1860, pp. 357, 385, 387.

barometer fell more than an inch and a half in less than nineteen hours, terminating at 2 40 a.m. this morning in a minimum of 28·87. At this minimum it stood for about 40 minutes and then the hurricane began. In less than three hours after its commencement the mercury rose nearly eight-tenths to 29·65.[9]

1860, *November* 21. Fearful storm of wind at Penzance from S. and S.W.—the rain in twenty-eight hours being 1·34 inches and the barometer at a considerable minimum. The minimum at Kew (29·517) did not occur till the following day, the wind there being W.S.W. and W., and the fall of rain in twenty-four hours 0·396.

1860, *December* 20. Dreadful thunder-storm in Cornwall—Kenwyn church tower near Truro struck by lightning. The minimum of the barometer at Kew (29·446) occurred on the preceding day, the wind there being E., S.E., and S.

1861, *January* 21. Barometer at Penzance and Kew at a very considerable maximum—that at Kew being 30·483 with wind from W.S.W. and S.W.

1861, *February* 18—19. Terrific storm from about S.W. throughout England, commencing this night at Penzance and continuing until the 21st, when being at its height between 3 and 4 o'clock in the afternoon it did considerable damage to the houses in Penzance, and was more violent than any storm there for many years. In London the same afternoon, but some hours later, "chimney stacks out of number were crashing down, roofs torn off, and trees uprooted"—at Lloyds the anemometer at 6 30 p.m. marked a pressure of thirty-six pounds to the square foot: and an hour afterwards the north wing of the Sydenham Crystal Palace was blown down. The barometer at Kew on 21st was at the great minimum of 29·343.

1861, *March* 20. Great earthquake in South America (p. 117)—barometer at Kew this day, and

[9] Illustrated London News for 29 December, 1860, p. 632.

two days before and two days after, most remarkably fluctuating.

These examples of apparent lunar periodicity seem as worthy of attention as those of diurnal periodicity mentioned by Humboldt—and as all of them (including those observed by Humboldt) resulted probably from changes in the magnetic or electric state of the earth or atmosphere, which is periodically varying, not only each day but also according to the positions of the sun and the moon in respect of the earth, it seems highly probable that at the end of each lunation when the circuit is completed, and the sun, moon, and earth have returned to nearly the same relative positions which they had at the beginning, the magnetic and electric states of the earth and atmosphere, and the weather consequent thereon, would also be nearly the same at the end as at the beginning, subject only to such modifications as other intervening influences may occasion.

My attention was first drawn to this subject by observing, whilst preparing an account of the extraordinary agitations of the sea on *5th July* and *30th October*, 1843, that the interval between them was very nearly the same number of days as between the two extraordinary agitations of the sea at and after *each* of the great earthquakes of 1755 and 1761.[10] But it did not occur to me that this interval of about

10 Although Ilfracombe is the only place mentioned where the oscillation on 27th February, 1756 (118 days after the great earthquake of 1st November, 1755), occurred (Phil. Trans., XLIX. p. 642)—yet as it was very considerable there, it was probably observed also in other places without being recorded. The oscillation in Mount's-bay, Falmouth, Fowey, and Plymouth, on 28th July, 1761 (119 days after the great earthquake of 31st March, 1761), would never perhaps have been recorded had it not been noticed by Borlase. The oscillation of 1st November, 1755, was observed at Ilfracombe as well as in Mount's-bay. There was also an interval of 118 days between the oscillation of the sea in Cornwall on 25th June, 1859, and the earthquake-shock in Cornwall on 21st October, 1859.

118 days was almost exactly four lunations until my brother (T. R. Edmonds) mentioned it. This led me to pursue the subject, until ten successive days presented themselves at intervals of about four lunations each, every day being distinguished by an earthquake, an extraordinary oscillation of the sea, or some unusual state of the atmosphere—and none of these phenomena so distant as forty-eight hours from the moon's first quarter. The following are the dates and the occurrences.

1842, *November* 9. Earthquake at Montreal and other parts of Canada.

1843, *March* 10. Earthquake at Manchester.[11]

1843, *July* 5. Extraordinary oscillations of the sea in Penzance, Plymouth, Scotland, &c., and a great thunder-storm throughout the island.

1843, *October* 30. Similar oscillations at Penzance and Plymouth.

1844, *February* 26. Barometer at Penzance 28·50—having fallen nearly two inches in thirty-six hours. At Chiswick 28·624, lower than for 409 days before and for *exactly four years* after, when on 26th February, 1848, it was 28·452—the fluctuation throughout England having been most unusually great.

1844, *June* 23. Very severe thunder-storm this evening throughout Cornwall and in Dumfriesshire; and on the following morning at Boston and Liverpool: at which latter place "pebbles and small eels descended in the streets." [12] Thermometer at Chiswick on 23rd 91°, the highest for the year except *25th July*. At the Greenwich Observatory at 1 p.m. a thermometer placed on "a small piece of raw wool in the sun's rays rose in seven minutes to 155°, and was still rising when the thermometer was taken away."

1844, *October* 18. Terribly destructive earthquake during a profound calm at Salta and other provinces

11 British Association Report, 1843, p. 121.

12 Literary Gazette, p. 420.

in South America, at 10 30 p.m., extending more than 1000 miles from N. to S. On the same day the town of Buffalo on Lake Erie was almost destroyed by a hurricane.[13] This was twenty-four lunations after the earthquake in that neighbourhood already mentioned. At Chiswick this day the maximum of the thermometer (56°) was less by 3° than for several months before: the barometer on the 16th was at a minimum of 28·940, lower than since 26th February.

1845, *February* 12. This was probably a colder day than had occurred in England previously during the present century. Thermometer at Blackheath, at 7 30 a.m., 33½° below the freezing point: at Chiswick 35° below that point. But in the morning of Christmas day, 1860 (as recorded by Mr. Lowe at his Observatory in Beeston), "the temperature at four feet above the ground was 8° below zero, and on the grass 13·8° below zero, or 45·8° of frost."

1845, *June* 13. Extraordinary oscillations of the sea in Kent,[14] and a "terrific" thunder-storm at Chatham.

1845, *October* 8. Within half-an-hour after the moon's first quarter the barometer in Penzance near the close of a heavy storm from S.S.W. descended to 28·75, lower than for six months before and 103 days after.[15]

Here ends the series of ten remarkable days separated by intervals of four lunations each.

The following remarkable maxima of temperature[16]

13 Gent. Magazine for December, p. 637.

14 This was observed at Folkestone at 4 p.m., and is thus described in the Newspapers:—"The tide then flowing changed to ebbing three different and continuous times, causing much agitation of the sea at the harbour's mouth. This had been preceded by a heavy and brief whirlwind from S.E. The rise of the water appeared to be about three feet."

15 At page 121 this storm and the storm exactly one lunation after it are mentioned.

16 The maxima stated are those at the Horticultural Society's Gardens at Chiswick, the only ones to which I had access.

during the twelve years (1839—1850) were also nearer to the moon's first quarter than to any other except that of 5th July, 1846; but the great thunder-storm of that day commenced the preceding evening when the moon was nearer her first quarter than any other. These are the annual maxima of the twelve years except 1839, when the annual maximum was 1° higher, and except 1847, which last however would scarcely be regarded as an exception if allowance be made for the early time of the year (23 *May)* in which the maximum of 89° occurred. Most of the maxima were accompanied by thunder-storms or extraordinary oscillations of the sea.

1839, *June* 18 (84°). This was the maximum of the year except one day in August, when it was 85°. On *20th May* (one lunation before) it was 73°, the maximum of the month. On *17th July* (one lunation after) it was 80°, the maximum of the month except one day when it reached 81°.

1840, *August* 3 (87°). The maximum of the year.

1841, *May* 27 (82°). In Dumfriesshire and Chiswick this was the hottest day of the year except 12th September when at the latter place the barometer was 84°. At Chiswick there was much "sheet lightning at night with occasionally some of the zigzag and forked kind with thunder and abrupt showers in large drops." In Truro, Cornwall, "on the evening of the *26th*, a very remarkable series of electrical explosions commenced, the discharges continuing through the whole night with very little intermission, embracing a large portion of the central districts of the county, and repeatedly presenting a most brilliant appearance from the flashes bursting simultaneously from almost the whole circuit of the heavens." On 29 *April* (nearly a lunation before) the thermometer at Pencarrow, in Cornwall, was 80°, the maximum of the year there.

1842, *June* 13 (90°). The maximum of the year.

At Boston, in Lincolnshire, the 14*th* was the hottest day of the hottest June since 1826.

1843, *July* 5 (88°). The thermometer in Brighton as well as Chiswick was at its maximum for the year. Extraordinary oscillations of the sea and great thunder-storm in different parts of Britain.

1844, *July* 25 (92°). Maximum of the year. On the 23*rd* of the preceding month (moon's first quarter), when the thermometer at Chiswick was at the maximum of 91°, there was an unusually severe thunder-storm in Cornwall and Dumfriesshire, and the following morning at Boston and Liverpool. On 23*rd July* (one lunation afterwards) it became very dark at Penzance, as if another thunder-storm were approaching, and the barometer fell to a considerable minimum, on which day there was another thunder-storm in Dumfriesshire.

1845, *June* 12 (85°). At Penzance (as well as Chiswick) this was the hottest day of the year (77°), except 9*th* and 10*th September* (three lunations afterwards) when it was 1° higher (77° and 78°). On 13*th June* an extraordinary oscillation of the sea occurred at Folkestone, and a "terrific" thunder-storm at Chatham.—In the night of 12–13 *May* (one lunation previously) the sea from the Land's-end to Plymouth was remarkably luminous.[17]

1846, July 5 (95°). At Boston, in Lincolnshire, this was the hottest day since 31st July, 1826. A great thunder-storm passed through Britain, having commenced in Mount's-bay in the evening of the 4*th*. On 1*st August* (nearly a lunation afterwards) London was visited with a hail and thunder-storm more destructive than any there since 18th May, 1809. On each of these days (5th July and 1*st August*) there was an extraordinary agitation of the sea in Mount's-bay.

1847, *May* 23 (89°). The highest temperature for many years at so early a season. Extraordinary

17 See Report of the Royal Institution of Cornwall for 1846.

agitations of the sea along the coasts of Cornwall and Devon.

1848, *July* 6 (88°). The hottest day of the year throughout the country. Extraordinary oscillations of the sea on the following day at Lyme, Dartmouth, &c. On 11*th May* (nearly two lunations previously and almost exactly twelve lunations after the 23*rd May*, 1847, above mentioned), the thermometer at Chiswick was 84°, and it is remarkable that the temperatures on these days (11*th May*, 1848, and 23*rd May*, 1847) were not only the highest for those years up to such times, but higher than for exactly fifty days afterwards in each case, except on the 4th or 5th day after, when it reached 91° (see p. 123).

1849, *June* 24 (89°). Maximum of the year. On 26*th* of the following month (the day before the moon's first quarter) London was visited with a thunder and hail storm more violent than any there for many years—although not so destructive of property as that of 1*st August*, 1846.

1850, *July* 16 (89°). Maximum for the year at Chiswick and Greenwich. The thermometer at Brighton was 80° on the 15*th*, and very high also on 16*th* and 17*th*. At Penzance it was remarkably sultry on the 15*th*, and the clouds a little before noon gathered there from the S. as if a thunder-storm were approaching, and it rained most of the afternoon. Bristol that afternoon was visited by a dreadful thunder-storm. On the following day (16*th*) equally fearful thunder-storms occurred in Lancashire and at Chatham and Rochester;[18] and "several houses in Orleans were nearly destroyed by a waterspout." On the 17*th* similar thunder-storms were felt at Brighton, Reading, Guildford, and New Galloway, at which

[18] See Mr. P. Clarke's account of some extraordinary electrical appearances at Manchester on this day in British Assoc. Report for 1850 (Sections).

last place there was at the same time a waterspout:[19] in Dumfriesshire the thermometer on the 17*th* was at its maximum for the year (76°), with thunder. On the night of the 18*th* a storm from the E. visited the Atlantic shores of the United States, greater than any for half a century.

On 19*th* *May* (two lunations before) the thermometer at Chiswick was 72°—higher than it had been for the year, and it did not exceed that elevation for ten days afterwards.

On 18*th* *April* (the day before the moon's first quarter) the thunder and hail storm at Dublin was the severest remembered there. This was a warmer day in Mount's-bay than any previously for the year, and for twenty-three days after—the atmosphere in the evening being in a highly electrical state. In London, for the week ending 19*th* *April*, the thermometer on every day was higher than the average of the same day for the last seven years, and the mean temperature of the week was 48·9, being 3° beyond the average. In Scotland the air was equally sultry on the 18*th*, 19*th*, and 20*th* April. On the last of these days 10,000 trees were rooted up by a storm at Strathspey in Invernesshire, and on the same day was a dreadful thunder and hail storm at Dorking in Surrey.

All the dates in italics in this chapter are at or near the moon's first quarter—and the examples of apparent lunar periodicities in the last three or four pages are exclusively maxima of the thermometer, although the examples in the pages preceding are sometimes maxima and sometimes minima, and sometimes of the barometer and sometimes of the thermometer: and it might therefore be objected that the proof of lunar influence would have been more satisfactory had the examples been all maxima or all minima of the same instrument. But it must be borne in mind that the weather, being at all times dependent on the ever

[19] See the woodcut in Illustrated London News of 27th July.

changing electric or magnetic state of the atmosphere, must be very different in most respects immediately *after* a discharge (visible or invisible) of its electricity or magnetism, from what it was immediately *before;* and a considerable maximum one day might be followed by a considerable minimum the next.

Some have concluded that the moon has no sensible influence on the weather because the means of the observations of the barometer or other instrument on the days of new and full moon and of the quarters respectively shew no difference between any one of these four days and any other; but these observations warrant no such conclusion, as the change expected rarely occurs at the precise day, owing to other influences retarding or accelerating it.

Others deny such influence because it is not apparent in the averages of the readings of each respective day of the new and full moon and quarters conjoined with the two days before and the two days after it. But should any remarkable change occur it could not be detected by such averages, as the maximum or minimum in the former part of these five days would be often neutralized by an opposite state of the instrument in the latter part.

The only way therefore of ascertaining whether the the moon's first quarter is or is not most remarkable for excessive meteorological changes is to refer each excessive or remarkable state of the atmosphere to such of the moon's four quarter days to which it may be nearest, and then to compare the results.

After my papers on this subject appeared in the British Association Reports for 1845 and 1850 (Sections), the following remarks were made in the Report for 1857 (Sections) by Mr. J. Park Harrison—"a fall in temperature having been found to recur with some frequency between the new moon and her first quarter and a corresponding rise shortly after her first quarter," observations were made and "it appeared

beyond question that decided effects (depending on lunar influence) occurred at the time referred to and even that a single day—the 3rd before the first quarter —was on the annual mean of considerably lower temperature than another day, viz, the 2nd day after the first quarter."—And Mr. Johnson, the Radcliffe observer at Oxford, has found that the cloud-dispelling power of the moon begins after she "is four or five days old and lasts till she approaches the sun again the same distance on the other side." "A clearing of the atmosphere, to whatever attributable, by increasing solar as well as terrestrial radiation, and so producing extremes of heat and cold, would, it is evident, be sufficient to account for some of the results enumerated in this communication." [20]

I will add only one fact more, shewing the influence of the moon on the weather. The fall of rain in London and its vicinity, as observed by Mr. Fulbrook[21] during a hundred successive courses of the moon (seven and a half years), was 47·60 inches in 500 days when ascending through the plane of the earth's orbit, and only 26·42 inches in 500 days when descending. This he supposes to be due to alternate southerly and northerly currents depending on the ascent and descent of the moon through the plane of the earth's orbit.

Although I have in this chapter dwelt so much on the influence of the moon in producing meteorological changes, I have given also many examples of a similar influence exercised by the sun, as well annually as daily: and that this influence of the sun like that of the moon, is independent of temperature, and results from its magnetic effects on the earth, might have been inferred from the fact of the intensity of the earth's magnetism, *in both hemispheres*, being greater in December (when it is nearest the sun) than it is in any other month.[22]

20 British Association Report for 1857 (Sections), pp. 248, 253.

21 British Association Report for 1857 (Sections), p. 29.

22 British Association Report for 1854 (Sections), pp. 358, 361.

The facts mentioned in this chapter are not opposed to the opinion generally entertained by geologists that earthquakes and great atmospherical changes frequently proceed from the supposed fiery ocean beneath the crust of the earth—for the attraction, or the magnetic influence, of the sun and moon on that ocean would produce tides or other effects therein occasioning directly or indirectly great disturbances of the earth and the atmosphere. Professor Phillips in his address, as President, to the Geological Society, in 1859, states, that "the results of many recent researches (shewing the reality of the lunar influence on terrestrial magnetism and the temperature and pressure of the atmosphere) seem to point to an influence exerted by the moon's attraction on the interior masses of the earth." This influence, however, he considers inadequate to be the *cause* but only determines the *time* of an earthquake. Mr. Mallet after observing that currents of electricity and magnetism "are ever passing, with variable activity, through enormous volumes of the earth's crust, the different parts of which possess very different conducting powers"—adds, "can it be that these currents, constrained to pass through narrow and bad conductors, at vast depths, in some formations, ignite them in their progress? If then, as seems at least possible, there be a direct connection (still more if this be one of cause and effect) between volcanic action and the forces of electricity and magnetism; * * * and if again these are modified and possibly determined in their extent and laws of action by the astronomic motions of the earth, and by its variable reception of heat from the sun, and dissipation thereof again in celestial spaces; it must result that the volcano and the earthquake *are not* independent of the laws which determine climate and regulate the vicissitudes, and the limits of perturbation of the seasons."[23]

[23] British Association Report for 1850, p. 77.

CHAPTER XIII.

WHIRLWINDS AND OTHER ATMOSPHERICAL PHENOMENA.

At 1 p.m. of 12th December, 1846, four whirlwinds or waterspouts were seen approaching the coast north-west of Penzance in parallel lines in the direction of the wind, then blowing a storm from N.N.E. Three of them having reached the northern shores of St. Just, passed through different parts of that parish, unroofing houses, overturning furze and turf ricks, and carrying along a great quantity of snow, with stubble, birds, slates, tiles, pieces of wood, and other things caught up in their progress. Sometimes they rushed along the ground like so many clouds of mist without any definite forms. At other times they assumed the appearance of very elongated inverted cones reaching from the earth into the clouds. As they advanced, each column revolved on its axis with varying rapidity which appeared to be greatest when the diameter of the column was least. Their progressive velocity was between 10 and 15 miles per hour. Large hailstones fell at the time of their passing, and destroyed the glass in a great many windows, the hailstones in and near the town of St. Just, being nearly as large as marbles. The fourth or westernmost whirlwind, appears to have swept over a small portion of the land close to Cape Cornwall.

The counting-house of Wheal Spearn was so fearfully shaken by one of them, that those within expected it would have fallen. Mr. Pearce of Penzance who was then near it, beheld only a minute or two previously,

a most magnificent electrical phenomenon. At the distance of a mile or two in the direction of Cape Cornwall, there suddenly rose from the sea or the land near it to a vast height, a pillar of fire exceedingly vivid and apparently of the thickness of a man's arm. On reaching its highest elevation it spread itself from the top in all directions with splendid coruscations followed by a terrific peal of thunder. This form of the lightning shews that it must at that moment have passed from the earth into the clouds along the axis of the most western whirlwind. The shock in its immediate neighbourhood was tremendous. Two men at a considerable distance from each other were struck to the earth, one of them in a barn, the other on the open common. Nor was it confined to the surface. Underground in Bosweddan mine near the Cape, the miners felt it severely at the depth of forty-four fathoms, the sensation being like that produced by an artificial electric shock; and the deafening thunder heard by those above ground seemed to the terrified miners beneath as the sound of the falling in of the sides of a shaft. It is worthy of remark that the noise thus heard underground was precisely similar to that which is heard by miners beneath the surface during shocks of earthquakes (ante, p. 117).

On the following morning, 13th December, at sunrise, the electric fluid in striking a house at Polmennor near Penzance, then uninhabited, passed through three rooms from one end to the other of a continuous series of copper bell-wires and iron cranks without breaking any of the plaster except on reaching and quitting the two extremities of this conductor: the wires however were completely burnt, and the resulting metallic colours were cast upon the walls and ceilings in the most remarkable forms.

One of the wires extended from the ceiling of a room to the floor by the side of a limed wall to which it was fastened by small iron staples which remained

uninjured in their places after the combustion of the wire. On each side of this vertical line the wall has been coloured in a most extraordinary manner. It seems as if a double tier of flames issuing from the wire horizontally, right and left, to irregular distances, had marked the wall with rays or pencils of various shapes and lengths ranged one over another on either side of the line, not unlike the leaves on the opposite sides of a fern stalk. Amongst the vivid colours forming these pencils, the most conspicuous is a deep purple,—each pencil being broadly edged with pure yellow. The wall has been thus marked from the ceiling to the floor over a breadth varying from a foot to above a foot and a half. Mr. John G. Moyle kindly made a painting of this for me in oil colours, which I have presented to the Penzance Natural History and Antiquarian Society.

On the ceiling of the same room, along the site of another wire, the colouring is still more remarkable, being in fact a spirited picture of a volcano in eruption. A yet more striking picture of a volcano on a larger scale (seven feet by five) is described on the ceiling of the next room into which the wires ran. In each of these volcanic representations detached masses of rock or other projectiles are being shot up from the crater, while bright flames of yellow, green, red, and brown, ascend to a considerable height terminating in a cloud of smoke.[1]

The Sunday morning when this happened will be remembered also for the unusual depth of snow which had fallen the previous day and night, whereby the heavy shower of hail that instantly followed the lightning was scarcely noticed.

Almost exactly thirteen years after these whirlwinds and thunder-storm another very remarkable whirlwind passed close by the west end of Penzance on the

[1] When I first wrote this account these tracings by the lightning were uneffaced—but none of them are any longer preserved.

14th of December, 1859, at 3 p.m. It had the form of an inverted cone white as snow, and travelled in a nearly straight line from N. by E. to S. by W., at the rate of about 10 miles an hour accompanied with a tremendous roar from which the cattle in the fields fled with terror. The sound was compared to that of a dozen railway trains passing at one time over as many wooden viaducts, and was heard in several places sixty or eighty seconds before the whirlwind arrived. Its whiteness proceeded from the great quantities of snow it had caught up, much of which it afterwards formed into huge snowballs and at intervals cast them to the ground. Its track from Trevayler to Zimmerman's Cot, a distance of more than two miles, was in several places strewn with uprooted trees. The rookery at Trevayler, the seat of the Rev. William Veale, was the first place that suffered. Through the midst of it descends in a straight line towards the N.E. an avenue or road bordered on each side with a row of tall elms: down this road Mr. Veale's coachman had gone that afternoon with his fowling-piece and dogs, but had scarcely reached the grove of ash-trees at the foot of it before he heard a most fearful roar, and soon afterwards during a furious hailstorm the trees of the grove were swayed to and fro in a most terrific manner and the dogs gathered round him for protection. When the whirlwind had disengaged itself from the trees he saw it rushing towards the S. by W., carrying up the snow from the ground to a height of between one and two hundred feet. Its rotation was north, east, south, and west, contrary to that of revolving storms in the northern hemisphere. On returning up the avenue he beheld three of the elms on its north-western side torn up by the roots and lying across the road with their heads towards the south, and an elm on its south-eastern side torn up and prostrated with its head likewise towards the south. When I visited the spot three or four months afterwards I was struck with the

remarkable manner in which the whirlwind had acted. It fell in an oblique direction, first on the north-west side of the avenue: and I observed on that side, as I walked down, a tall elm half rooted up and almost ready to fall across the road. Five or six feet farther down on the same side were the remains of another elm which had been quite rooted up and thrown across the road. Then came four tall elms not at all injured, occupying thirty-six feet on the same side. Below these were the remains of two other tall elms which had been rooted up and thrown across the road. Such is the description of about eighty feet of the north-western side of the avenue—its trees above and below this being uninjured. On the south-eastern side only one tree was blown down, and that was directly opposite the higher of the two last mentioned uprooted elms. These facts seem to shew that the centre of the whirlwind, where the four tall elms were left standing and uninjured, was comparatively powerless—that its great strength lay between twenty and forty feet from its axis—and that its eastern side, by which the three last mentioned trees on opposite sides of the avenue were prostrated, was more powerful than its western side; this last circumstance being due probably to its rotating north, east, south, and west, as it advanced southward—for the rotatory motion and the progressive motion would be thus combined on its eastern side to form its maximum power.

Similar effects were produced a mile and a half S. of Trevayler, near the entrance-gate of Alverton House at the west end of Penzance. A large elm about forty feet eastward, and another tree about thirty feet westward of that gate, were blown down, but the intervening tall elms were left uninjured. In the same manner it passed through the orchards south of Alverton House, rooting up the apple-trees on its east and west, but leaving those in the middle of its path scarcely damaged. A woman was caught in it at

Alverton, but being near its centre she escaped unhurt, although unable to breathe for a few seconds from the violence of the wind. Here too, as at Trevayler, the eastern side of the whirlwind appeared more powerful than its western. And it is very remarkable that at Trevayler and Alverton *all* the trees overturned, whether by the eastern or by the western side of the whirlwind, were prostrated with their heads towards the south, or between S. and S.E. This was stated to me so clearly and positively by the coachman at Trevayler and the occupiers of the orchard that I have no reason for doubting the fact. The whirlwind after passing close above Higher Lariggan and destroying part of a field of brocoli plants, as if a harrow had been drawn over them, proceeded down the hill to Zimmerman's Cot, in the orchard of which it overturned some fruit-trees and snapped asunder the trunk of a large ash close by the road and stream running from Trereife Smelting House to Newlyn. Beyond this spot it appears to have continued its course in the same direction to the sea without doing much further damage. The boisterous state of the weather on this occasion has been already described on p. 95.[2]

2 A whirlwind of about the same height and power but far more sublime, produced by artificial means, is noticed in Reid's Law of Storms (2nd Edition, p. 485). A field of bushes and brushwood, in America, which had been cut and become perfectly dry, was all set on fire at once on a very calm day, and the Honorable Theodore Dwight, a spectator, thus describes the result:—"Upon the fire becoming general throughout the field, a whirlwind had formed in the midst of the flames, and when I first saw the phenomenon, its appearance was sublime and awful. The flames were collected from every side into a large column, broad at the bottom but suddenly tapering to a much smaller size, and it stood erect in the field to the probable height of 150 to 200 feet. It was a pillar of most vivid flame, whirling round with astonishing velocity, while from its top proceeded a spire of black smoke, to a height beyond the reach of the eye and whirling with the same velocity as the column of flame. The noise produced by this whirlwind was louder than almost any thunder I ever heard; and being much longer continued, was heard

The following atmospherical phenomenon, although of very common occurrence, has never yet been explained. A murmuring or a roaring noise proceeding from the shore is sometimes heard at the distance of several miles inland, whereas at other times, although the atmosphere may appear equally favorable for transmitting sounds, no sound whatever from the shore can be heard at the twentieth part of that distance, and yet to a person on the shore from whence the sounds proceed, the noise of the sea may be quite as loud on the one occasion as on the other.

When this "calling of the sea" is heard inland during a calm the next wind that springs up is, in nine cases out of ten, from about the direction of the calling. I state this principally on the testimony of several intelligent persons who have for many years in different localities on the south, north, and west coasts been observing these indications. If during a gentle breeze the calling proceed from the same direction as the wind, the wind will remain longer in that quarter than if no such calling had been heard. During a strong wind there is no calling. An old proverb current here confirms these remarks:—

When Pons-an-dane calls to Lariggan river,
There will be fine weather;
But when Lariggan calls to Pons-an-dane,
There will be rain.

These streams enter the sea in the inmost parts of

at a greater distance than is commonly the case with thunder. During the whole period of its continuance, the pillar of fire moved slowly and majestically round the field; but generally the air was entirely free from both fire and smoke except what was collected in the column. The force of the whirlwind was so great, that young trees of six or eight inches in diameter, which had been cut and were lying on the ground, were taken up by it, and carried to the height of forty or fifty feet."

The terrific pillars of sand raised by whirlwinds which Bruce saw in the desert of Nubia, were "at times moving with great celerity, at others stalking on with a majestic slowness: at intervals we thought they were coming in a very few minutes to overwhelm us. Again

Mount's-bay. Their mouths are N.E. and S.W. from one another and one mile and a half apart—having the eminence on which Penzance stands, between them—Pons-an-dane being N.E. As the mouths of these streams are very deeply embayed, the calling from either of them cannot possibly arise from a ground-swell proceeding from a distant storm at sea from N.E. or S.W., although on an open shore a ground-swell often indicates the direction of an approaching storm. One of the principal fishermen at Cadgwith near the Lizard informed me, that when a steam-boat passed round the Lizard on a calm evening or morning and he heard the sound of her paddles remarkably louder in one direction than in any other, he almost always found the next wind was from that direction.

Some suppose that the very fact of our hearing sounds louder in one direction than another, is a proof that the wind had already begun (although insensibly) to proceed from thence. But a breeze is often at such times felt by the observer contrary to the course of the sound. On one occasion I heard the sea calling loudly from the E. or S.E. during a contrary wind, but the clouds were then passing in the same direction as the sound: the next morning it blew on the earth's surface from the quarter whence the calling and the clouds had proceeded, so that the wind in the higher regions had (as is usual) descended to the earth's surface.

It is commonly said that an unusual audibility of distant sounds is a prognostic of approaching rain; but this, after what has been now stated, must be received with considerable qualification—for it is no indication of approaching rain unless the sounds proceed from a rainy quarter.

they would retreat so as to be almost out of sight, their tops reaching to the very clouds."

These descriptions may assist in picturing the sublimity of the whirlwind out of which the Lord answered Job, or of that by which Elijah was caught up into heaven.

The subject is important, not only to fishermen and sailors, and owners of ships and cargoes, who may be thus forewarned of approaching storms or changes of wind; but also to agriculturalists, as rains and frosts and the temperature of the air depend so much on the direction of the wind.

Our storms from between S. and W. are much more frequent than those from any other direction;[3] and as storms from the S.W. are felt in this district many hours before they reach London or Liverpool, timely warning may be given to those places through the electric telegraph, not only of a storm actually raging here, but of any unusual depression of the barometer or other indication of a coming storm. At midnight of 25—26 February, 1848, my barometer suddenly dropped alarmingly low—lower than I had ever before seen it; I immediately went to the quay to warn the sailors of an approaching hurricane, which came on two or three hours afterwards, and was one of the most violent ever experienced in Mount's-bay.

[3] On the south coast of England, violent gales usually set in with the wind about south, or south-south-east, and veer by the west towards north-west. The barometer falling at the commencement, rises as the wind becomes northerly. In the corresponding latitude in the southern hemisphere, this order, as regards both the wind and barometer, is reversed" (Reid's Law of Storms, 2nd Edition, p. 409).

"Off the south coast of Terra Australis the progress of the gales is usually this: the barometer falls to 29·5 inches or lower, and the wind rises from the north-west, with thick weather, commonly with rain; it veers gradually to the west, increasing in strength, and when it veers to the southward of that point, the weather begins to clear up; at south-west the gale blows hardest, and the barometer rises; and by the time the wind gets to south or south-south-east it becomes moderate, with fine weather, and the barometer about thirty inches" (Ibid, p. 412).

"The wind in the North Atlantic revolving in circles of great diameter, so as to cause storms to be generally *north-east storms* on the east coast of America, and *south-west gales* on the west coast of Europe, may be one of the causes, if not the principal one, of the difference of temperature between places in the same latitude in the Old and New Worlds" (Ibid, p. 543).

"There are in France at the present moment twenty-four centres of observation from which are forwarded every morning to Paris records of the height of the barometer, the temperature, direction of the wind, &c., and a digest of these observations is transmitted the same day to distant parts of France and of Europe." "Observers are already stationed in the meteorological watch-towers of Copenhagen, Lisbon, and Galway, watching the signs of the Baltic, the Mediterranean, and the Atlantic, where our weather is manufactured: and we may look upon it as one of the possible results of all this intelligent activity that we shall be able to foretell the weather three days in advance." M. Le Verrier's object is (to use his own words) "to mark a a storm as soon as it may appear in any point in Europe—to follow it in its march by means of the telegraph, and inform in seasonable time the coasts that it will probably visit."[4] Similar observations are made in this country by the Board of Trade under the most excellent superintendence of Rear Admiral Fitzroy, F.R.S., and once a day, at 9 a.m., the telegraphic communications are made to the Board from the most distant parts of British and Irish wires, Penzance being one of the places thus communicating, and the results are published in the *Times*. Moreover "Storm warning signals" are hoisted in our principal shipping ports (including Penzance) a day or two before the arrival of the storm.

It is a reproach to Penzance that no monument has yet been erected to Sir H. Davy in his native town. A very useful one would be an Observatory on the top of the ancient hill-castle of Lescudjack, close above the terminus of the West Cornwall Railway. An Observatory there, superintended by a good practical meteorologist, who should always give immediate warnings throughout Britain of every important change in the weather, either commenced or indicated

[4] British Almanack for 1861 (Companion), pp. 29, 38, 39.

here, would be of incalcuable advantage to the nation. As an astronomical Observatory its situation would also be very favorable; for although it may rain oftener in Penzance than in other parts of England, the rains are sooner over, and the sky here is often clear when most of the island is clouded.

Before I close this chapter on meteorology, I will notice a very singular phenomenon which some regard as meteorological (mirage), others as astronomical (diffraction of light), but which appears to me as purely optical.

In 1845, when the occasional projection of a star on the moon's disc for a few seconds before its occultation was publicly discussed by eminent scientific men at the Annual Meeting of the British Association and elsewhere, I prepared a short paper suggesting that it might arise from the telescope being on such occasions set to the star's focus instead of the moon's; in which case the imperfect image of the moon formed at the stellar focus would of course be magnified, and would therefore, the moment before occultation, spread itself over the star's image, and thus occasion the apparent visibility of the star through the moon, the extent of this projection being equal to the excess of the radius of the magnified lunar image beyond that of its perfect image when brought to a focus. In the occultation of the star Aldebaran in 1829, the reason why out of thirty-one European observers eight did *not* perceive any projection, and twenty-three *did*, may be, that the telescopes of the former were suited to the lunar focus, and those of the latter to the stellar.

I did not however publish my remarks nor show them to any one until 1853, when my nephew (F.B. Edmonds) being with me on a visit, I desired him to read them with a view to test by experiment the correctness of my explanation. He accordingly placed a candle in the furthest corner of the room close behind a card, through a small hole in which the light flowed

to represent a star. Two yards from the candle he placed an illuminated disc to represent the moon—and then retiring three yards from the disc with a pocket spy-glass having its focus set for the "star," looked at the star along the edge of the "moon," when the former appeared very clearly projected on the latter, precisely as in the reality observed by astronomers. When the focus of the glass was set for the moon no projection whatever occurred.[5]

I immediately communicated this to Professor Airy, who kindly informed me that the explanation would be satisfactory, if the focal length of the telescope for the moon were sensibly different from that for the star. "It would be highly desirable however" he added "to bear this consideration in mind in the case of another observation of the occultation of a bright star."

Should the eye be unable directly to detect any difference between the lunar and stellar foci, the existence of a sensible difference between them would, I presume, be indirectly established, if the projection disappeared on lengthening the focal distance and reappeared on shortening it.

[5] A gentleman after reading the account of this, which I communicated in 1853 to the Penzance Natural History and Antiquarian Society, repeated my nephew's experiment on a grander scale, when on the beach one evening close to St. Michael's Mount. The edge of the tower was then almost in a line between him and a planet. Looking along that edge through a spy glass having a focus set for the planet, he saw the planet projected within the edge of the tower as clearly as the star was projected within the edge of the moon in the illustration mentioned.

CHAPTER XIV.

REMARKABLE GEOLOGICAL PHENOMENA—INTERMIXTURE OF GRANITE AND SLATE—SUBMARINE FORESTS—SAND-HILLOCKS.

Sir John Forbes (formerly of Penzance and now Physician to her Majesty's household) in his "Geology of the Land's-end District," observes that the whole line of coast with the exception of "some part of the western shores of Mount's-bay, and a few small bays of less consequence, is uniformly and remarkably precipitous—offering some of the finest cliff scenery in the island. This character of the coast is particularly favorable to the geologist, laying open to him, in every direction, by the most splendid natural sections, the exact structure and relations of the rocks of which the country is composed. Nor is the physiognomy of the rocks in the interior less remarkable than on the coast. On every hill the granite is seen protruding in the most fantastic forms from the scanty and imperfect covering of soil. * * * Although the alluvial covering is extremely scanty on the higher spots yet in the plains and in many of the valleys the deposition is considerable, reaching in some places twenty or thirty feet above the solid rock." "Its varied and uneven surface gives it a great profusion of small streams and rivulets which add greatly to its value as well as beauty."[1]

This peninsula consists chiefly of granite, the *killas* or slate formation (which includes "clay-slate, hornblende rock, greenstone, compact felspar, and slaty

[1] Trans. of the Geo. Society of Cornwall, II. p. 248.

felspar") constituting merely a narrow border round the greatest part of it.[2] The intermixture of the granite and slate is very remarkable at St. Michael's Mount, which "is entirely composed of granite, with the exception of a patch of the slaty felspar rock resting on its base on the north, north-east, and partly on the north-west sides. * * * At its junction with the granite on the N.E. and N.W. sides * * * there is a confused intermixture of the two rocks, the slate being traversed in all directions by shoots or veins of granite and the granite in its turn enclosing patches of slate. * * * The whole body of the granite is traversed by an uninterrupted series of quartz veins, which run parallel to each other with wonderful regularity. * * * On the north-east side of the Mount many of them can be traced into the incumbent slate. * * * The exterior parts of the veins consists of a bluish quartz very compact and uniformly containing shorl. In most of the veins there is a central line or fissure which divides them into two portions: this is formed by the close apposition and occasional union of two crystallized surfaces. In these fissures the quartz is found in the form of common quartz crystals, and sometimes as rock crystal. A great variety of other crystallized minerals are also found in these fissures. The most plentiful are topaz, tin-stone, and mica; but less plenteously are found apatite, wolfram, blende, &c. * * * The crystals of tin and of apatite are often of considerable magnitude—those of topaz are uniformly small; they are however extremely numerous—many hundreds being observable on the face of some small blocks of the granite that have fallen from the precipices."[3]

Another remarkable intermixture of the granite and slate is well seen at low-water at the back of Mousehole pier—the slate being traversed in all directions by

[2] Trans. of Geo. Society of Cornwall, II. pp. 246, 251.
[3] Ibid, II. p. 368.

veins of granite and quartz which intersect each other in numerous instances and in various ways; and the granite in its turn including imbedded portions of slate, and being filled with patches and veins of quartz.[4] But whilst no granite is found along the six miles of coast from the Mount to Mousehole, the twenty miles of coast from Mousehole around the Land's-end to Cape Cornwall consist of nothing but granite, except a patch of slaty felspar rock about two furlongs broad, extending three-quarters of a mile along the cliff of Rosemodris, and a patch of about a hundred yards in breadth of the same slaty felspar rock at the western extremity of Whitsand bay laid bare at low-water, and also a much smaller patch of slate a little to the west of the last at the foot of Pedn-men-du point. "It is a very curious circumstance that notwithstanding the great number of square leagues composed entirely of granite in Cornwall and Devonshire, that

[4] Mousehole island, according to Sir John Forbes, consists of slaty felspar rock (of a beautiful purple colour). Upon the same kind of rock, at the eastern end of Mousehole pier, rests a bed of hornblende rock, putting on in some places much of the character of greenstone. Penlee point, part of this bed, consists of fine hornblende rock: north of Penlee point is a bed of compact felspar rock, which gradually gets more and more of a slaty character, until it terminates farther north in a distinct bed of slaty felspar—"then follows a succession of beds of compact felspar and slaty felspar rock to the number of fifteen, which continue to Newlyn pier." The Lariggan rocks on the east of Newlyn are beds of hornblende more or less of a slaty character. The Gear rock (on which a pole stands) is greenstone, and so are the Battery rocks and the Round rock at Penzance. "The rock that formerly filled the Battery cove being of a softer slate has been washed away." Penzance pier partly rests on a vein of felspar porphyry (elvan), of the width of perhaps twenty yards, running nearly E. and W., being identical with that of which the Chimney rock forms part. This vein intersects all the rocks it meets with, and without heaving or giving a new direction to any of them. The rocks at the slip in Jennings' street, Penzance, are greenstone—those of Chyandour fine hornblende. The Cressars greenstone —the Long rock is another vein of felspar porphyry about thirty yards wide, very similar to the Wherry Mine vein. The Chapel rock between Marazion and the Mount is greenstone.

magnificent rock never appears in the cliff except for a few miles on each side of the Land's-end." [5]

In this district, as well as in other parts of the coasts of Cornwall, are "submarine forests" and "raised beaches," which geologists regard as proofs of a subsidence, and of a subsequent elevation, of the land. On the sea side of each of the two long sand-banks on the east and west of Penzance is a very extensive vegetable stratum, commonly called a "submarine forest," covered with sand, over which the sea flows every tide. That on the west of Penzance containing large forest and other trees, with hazel-nuts, leaves, the remains of beetles, &c., was fully described in 1826 by Dr. Boase:[6] that on the east of Penzance was the subject of a Paper twenty years afterwards by Mr. Carne.[7] As they do not differ materially from one another, I will confine myself to the latter. Mr. Carne states that on the northern or land side of the sand-bank between Penzance and Marazion, there is a low tract of land called "the marsh" (most of which is now drained and cultivated), consisting principally of a bed of peat from three to eight feet thick, and extending "upwards of two miles. At only one spot, near the Long bridge, is the peat taken away for fuel: there the bed appears near the surface, and is from four to seven feet thick, resting on a bed of sand of considerable depth, containing cockle-shells *(cardium edule)*. A stratum of alluvial tin-ore having been discovered in Huel Darlington, several fathoms below the surface, a pit has been sunk at a short distance east of that mine and near Marazion river, in order to discover the tin there: the section of the strata in this pit is most interesting.

"The first eight feet consist of slime, gravel, and

5 D. Gilbert's Cornwall, III. p. 432.

6 Trans. of the Geo. Society of Cornwall, III. p. 166.

7 Ibid, VI. p. 230.

loose ground (the slime having probably been conveyed there by the frequent overflowing of the river).

"The next four feet consist of a bed of peat, rather soft, full of minute woody fibres, and when dried fit for fuel." (This stratum and the next Mr. Carne considered to be continuations of those already mentioned near Long Bridge.)

"Below this is a bed of white sand, twelve feet in depth, containing a large quantity of the *cardium edule*." (This seems a continuation of the stratum of sand exposed to view on the shore at half-tide.)

"Under the sand there is a layer of trees, principally oak and hazel, all prostrate, and lying in all directions; the largest (oak) being about fourteen inches in diameter and thirty feet in length: hazel-nuts are very plentiful, both loose and on the branches of the trees: they contain no kernels, but are full of water. One piece of oak, about fourteen feet long, appears to have been wrought, as if it had been intended for the keel of a boat: the trees occupy only from one to two feet in depth, as there is rarely more than one in thickness: the crevices between them are filled with sand from above: these trees rest on a bed of hard solid peat, three feet thick, of closer texture than the upper bed, and very fit for burning." (This is probably a continuation of the vegetable stratum covered by the sand between high and low water.)

"Then we find four feet of alluvial tin-ground, the stones or pebbles in which are rarely larger than a cricket ball,—generally much smaller, and rounded at the edges: this stratum rests on the clay-slate rock."

There is thus, apparently, beneath and on each side of the long sand-bank between Penzance and Marazion, a marine deposit covering a very extensive layer of prostrate trees and plants of the same species as those which now "grow freely on the adjoining land:" and "in the Hayle estuary we again have evidence of trees and vegetable accumulations beneath the present level

of the sea." [8] Sir H. T. de la Beche observes that a similar vegetable accumulation frequently occurs in Cornwall, Devon, and western Somerset, "as a bed at the mouths of valleys, at the bottoms of sheltered bays, and in front of and under low tracts of land, the seaward side of which dips beneath the present level of the sea, so that the terrestrial vegetation forming those parts of the bed could not have grown at their present levels:" [9] and he considers it most clearly proved that the trees and terrestrial vegetation were submerged *in situ*, where they grew. He also considers that the proofs of the subsequent elevation of the land are equally clear. "It may be considered doubtful" he further says "how far this submarine forest (in Mount's-bay) affords support to the old tradition that St. Michael's Mount was named "Carreg lug en kug, or Le Hore Rock in the Wood," [10] six miles from the sea. If Mount's-bay were a wood in historical times he thinks it could not have begun to grow until the land which supported it had first subsided and had afterwards been elevated; then this newly elevated land with its subsequently produced woods and other vegetation might, without any second subsidence of the district, have been gradually washed away by the ordinary action of the waves.

Dr. Boase imagined that the sand-banks east and west of Penzance, at some remote period, "filled the greater part, if not the whole, of Mount's-bay; and that they have been for ages past, as at the present day, gradually diminishing under the incessant attacks of the waves:" [11] but I think my readers will agree with me before the close of the present chapter that such an opinion cannot be maintained: and that the late rapid diminution of these sand-banks has been

8 Geo. Report of Cornwall, Devon, and West Somerset, p. 418.

9 Ibid, p. 420.

10 Geological Report of Cornwall, &c., p. 418.

11 Trans. of the Geo. Society of Cornwall, III. p. 167.

effected, not by storms and the action of the sea, but by the hand of man.

Seventy years ago the sand-banks adjoining Penzance presented two beautiful walks of green turf, varying in breadth from about forty feet to nearly as many fathoms —the one stretching more than two miles eastward between Penzance and Marazion, and the other, one mile westward from Penzance to Newlyn—each being continuous with the exception of an occasional opening for communication with the beach. What was left of the "Western Green" in 1826 has been minutely described by Dr. Boase as already stated: and to preserve what still remained within the limits of Penzance, the Corporation in 1843 completed a strong wall forming the sea side of a noble promenade nearly half a mile in length. The bank between Penzance and Marazion through which the railway now passes has also been rapidly diminishing, but no sea wall there has yet been required.

The effect of this disappearance of the sand and of the consequent deepening of the water along shore is very remarkable at the causeway leading from Marazion to the Mount. This causeway or ridge of shingle is evidently formed by the meeting together of the waves from the east and west at every tide. Three hundred and twenty years ago Leland observed "the Mont is enclosed with the se fro *dim.* flud to *dim.* ebbe:"[12] and so it continued for "two hundred and twenty years" afterwards without "the least alteration."[13] But within the last eighty or ninety years a very sensible change has been effected: it is now enclosed eight hours out of the twelve, and sometimes at neap tides during the prevalence of strong S.W. winds the causeway remains covered for days together. This change in the period of the Mount's insulation

12 Itinerary, VII. p. 120.

13 Natural History of St. Michael's Mount by the late Mr. Price of Penzance, quoted in Polwhele's Cornwall, I. p. 153.

from half to two-thirds of the day appears to be owing to the removal of the sand that adjoined and supported the western side of the ridge, which has consequently lost much of its elevation, and is therefore covered proportionally earlier every tide. Another effect produced on the causeway from this removal of the sand and deepening of the water on its west, is that it has been bent or shifted near the centre, many feet further eastward than it was forty years ago.

Most persons imagine that the sea has been the cause of this disappearance of the sand, and doubtless it has often during storms undermined and prostrated large portions of our sand-banks, and carried out considerable quantities beyond the line of low-water, but in the course of the year the sea always deposits on the shore much more than it withdraws.[14] The great cause of the lessening of the banks appears to be the constant abstraction of the adjacent sand and pebbles between low and high water for manure, ballast, road-making, building, and other purposes. Some idea of the vast quantity taken for manure may be gathered from the fact that a very usual clause in farming leases in this neighbourhood for the last sixty or eighty years is that ten butt loads (tuns) of sea-sand

14 The times when the greatest deposits of sand take place are when the sea is smooth and clear, and the wind blowing from off the shore: then each little wave, as it runs up the beach with gradually diminishing velocity, deposits a great part of the fine sand which its original velocity enabled it to carry, and retires with a much less load of sand than it had on starting. On the other hand, if the sea be rough, the large waves have sufficient motion to keep the sand in suspension, not only as they advance, but also as they retire, so that no sand can be then deposited: and if, on such occasions, pebbles or shingle be also held in suspension, these may be deposited by the large waves on the same principle as the fine sand is by the small waves.

(See Sir H. T. de la Beche's Geol. Manual (3rd edit.), p. 79.)

shall be spread on every acre when broken for tillage; and the sand is often carted away over a hilly country to farms five or six miles from the coves which furnish it. The quantity used for ballast must be also very great, as Penzance is a place of considerable trade, and the *exports* are very little compared with the *imports*. That the causes now assigned are the true ones is confirmed by the fact already mentioned, that no diminution in the height of the shoal between the Mount and Marazion appears to have taken place for two hundred and twenty years after the time of Leland, during which period there was but little agriculture or commerce in the bay.

Thus while the sands in some neighbourhoods accumulate in the sea to the great peril of mariners, they are here deposited on the shore, where, after having for centuries served as pasture grounds or pleasant walks, and as barriers against the sea, they have latterly proved still more valuable for agricultural purposes. Husbandmen are aware that the soil from one district on being distributed over another, often proves highly beneficial to the latter. When, for example, fragments of granite are washed down into the bay, reduced to sand by the action of the waves, and then spread over a slaty or killas stratum, they tend greatly to its fertilization and *vice versa*. Thus in the great natural laboratory of Mount's-bay, during the lapse of ages, manures of various kinds, calcareous, silicious, and argillaceous, have been prepared without the expenditure of human labour, and treasured up on our coasts to be used on the neighbouring farms in any quantities that may be required.

The origin of these sand-banks, and of the sand-hillocks in this district now demands our attention. Davies Gilbert[15] describes the extensive sand-hillocks

[15] History of Cornwall, II. p. 150.

on the north-eastern shores of this district as "a model in miniature of the Alps": and another writer has compared them to waves of the sea, which, when raised by a tornado to enormous heights crossing and dashing against each other in every direction, were suddenly fixed for ever in their present chaotic confusion by an instantaneous conversion into ice. But these imaginative descriptions can be appreciated only by a spectator in the midst of them. They are called "the Towans," a name identical in signification and almost in sound with *downs:* and, singularly enough, the parish in the Towans, where an ancient market-town is said to have been buried in the sand,[16] bears the same name as the sandy district in the south-western coast of France, the former being written *Lelant*, the latter *Les Landes* -the letters *d* and *t* being interchangeable. These sand-hillocks consist of comminuted marine shells blown in from the shore and covered with turf, reeds, mosses, and other plants; beneath which, at almost all depths, is a great abundance of *land* shells. I went thither in 1848 with my nephew (F. B. Edmonds) and two other young conchologists, and in the short space of two hours we dug up with our bare hands twenty-six species of perfect shells imbedded at various depths in different parts of the sands. Amongst them the *Helix pulchella*, *Zua lubrica*, and some species of *Pupa*, particularly the *Pupa marginata*, were very abundant. We had not leisure to examine the surface for living individuals of any of the smaller species, but amongst the larger we observed the *Helix aspersa*, *virgata*, *ericetorum*, *caperata*, and *fusca*, and the *Bulimus acutus*. A list of the shells which we discovered is subjoined, to which I have added the *Zonites pygmæus*, which we found in the Whitesand-bay Towans, those marked with asterisks not being now in the living state in the Land's-end district: specimens of these twenty-seven species

[16] Ante, p. 62.

were presented by my nephew to the Penzance Natural History and Antiquarian Society.[17]

Some suppose, according to an old tradition, that these sands were all blown in during one tremendous tempest.[18]

Others (judging from the dark horizontal lines—the remains of old vegetable surfaces—which occur at various depths within a few feet beneath the present surface, and alternate with thick layers of light sand not containing any vegetable remains) consider that the hillocks were formed by a succession, at distant intervals, of thick layers of light sand, within which no vegetation ever existed. But this is inconsistent with the fact of perfectly preserved land-shells being found therein at all depths, indicating that each layer during its accumulation must have been continuously covered with turf to form a *habitat* for the entombed land-shells.

A third hypothesis which I suggested in 1846[19] is, that the sand has for the most part accumulated imperceptibly upon a continuously growing vegetable surface —the deposits during a single storm being too slight to cover the herbage, or to check its growth, except

17 *Bulimus acutus.*
——— *obscurus.*
Carychium minimum.
Clausilia biplicata.
Conovulus bidentatus.
——— *denticulatus.*
Helix aspersa.
——— *caperata.*
——— *ericetorum.*
——— *fulva.**
——— *fusca.*
——— *hortensis.*
——— *nemoralis.*
——— *pulchella.*
Helix virgata.
Pupa Anglica.
——— *marginata.**
——— *umbilicata.*
Vertigo edentula.
——— *palustris.**
——— *pygmæa.**
Vitrina pellucida.
Zonites alliarius.
——— *cellarius.*
——— *nitidulus.*
——— *pygmæus.**
——— *rotundatus.*

18 A similar opinion prevailed in reference to the sand-banks of Mount's-bay. See Trans. of Geo. Society of Cornwall, III. p. 179.

19 Trans. of Geo. Society of Cornwall, VI. p. 302.

occasionally. These occasional complete coverings and destructions of the herbage by sand-storms may be inferred from the thin dark lines above noticed: whilst the general gradual accumulation is shewn by the thick layers of light sand, containing no vegetable remains, but studded in all parts with land-shells so perfect that they must have been buried *in situ* (on the very spots where their inhabitants had been pasturing or hybernating) by gradual accumulations of sand which neither covered the herbage nor checked its growth.

These remarks are equally applicable to the calcareous sand-hillocks of Whitesand-bay, and the sand-banks on the east and west of Penzance; indeed most of the accumulations of sand on the coasts of Cornwall, Britain, and Europe above high-water mark have been probably thus raised to their present heights.[20]

To this process of accumulation by the agency of the winds, there is a remarkakle exception in the long sand-bank between Penzance and Marazion, the herbage of the highest parts of which appears to have been once completely covered by gravel and small pebbles deposited directly by the sea. In a section of the highest part of this bank near Marazion bridge, in

20 At the anniversary of the Royal Geo. Society of Cornwall following that at which I read a Paper containing the above remarks, Mr. C. W. Peach, so well known for his valuable communications to scientific societies, observed as follows,—"When I read Mr. Edmonds's Paper on the sand-hillocks of St. Ives bay, &c., published in last year's report, I made the following note,—'I am much pleased with this paper. It is a subject I have often pondered over in my own mind, from frequently noticing the few sand-hills near Carhayes Castle. My opinion is, that they are accumulations of time, not caused by a sudden tempest; still I allow that some portions appear to have been deposited in much less time than others. I agree pretty generally with the third hypothesis. I found similar shells (and in equal abundance) on these hills as those mentioned in the Paper, and also found the pretty *Helix pulchella* living, several times. I consider it, at least in that locality, rather plentiful. Once after a tremendous heavy rain, I found on the margin of a large pool of water, which had rushed from the hills on the beach, hundreds of them; many were living.'"

1846, I observed an extensive layer of small rounded pebbles and gravel three feet below the green surface, and not less than twelve or fifteen feet above the level of high-water; whilst in the subjacent sand, deposited by the winds alone, numerous perfect land-shells[21] were imbedded throughout a depth of four or five feet beneath the pebbles.[22] This was at the eastern extremity of the bank. Near its western extremity I saw, in 1851, a precisely similar stratum, and at the same depth from the surface in the deepest of the cuttings made for the railway, close on the eastern side of a line from Gulval church to the pole on the Cressars rock.[23] Here too perfect land-shells were imbedded throughout a depth of four or five feet beneath the pebbles. This stratum still remains, although faced up by a stone wall. The distance between the two spots is about a mile and a half. In each case the layer was about an inch thick, and extended between ten and twelve yards in diameter, over a part of the bank more elevated than the parts immediately around it, as if the wave which carried the gravel and pebbles to the top of the elevation had not in retiring sufficient velocity to withdraw them. I have also observed a similar marine deposit in the deep railway-cuttings through the same sand-bank near Half-way-house, with land-shells imbedded *in situ* throughout a depth of six feet beneath it.

It being thus evident that a very extraordinary irruption of the sea took place in Mount's-bay, sweep-

21 The *Helix virgata* and *Bulimus acutus*.

22 I recorded this in a Paper printed in the Trans. of the Royal Geo. Society of Cornwall, for 1846, p. 304. Soon afterwards the stratum of pebbles and gravel, undermined by the diversion of the neighbouring stream, fell and disappeared.

23 This most elevated western part of the sand-bank, or rather the western side of it, is remarkable also for being the only place in Cornwall where the *Cynodon dactylum* grows, which in France is one of the most common grasses found by the wayside.

ing over every part of a long sand-bank covered with turf, and in some places ten feet or more above high-water mark, it will be interesting to consider at what period this inundation might have happened. Assuming that the sand has accumulated on the higher parts of the bank, since the inundation, at the rate of one inch in twenty years (and the accumulation has not I think exceeded that rate during the last fifty years), and knowing that the present height of the bank above the layer of gravel then deposited is about three feet, we are carried back to about A.D. 1099, "when on the third day of the nones of November," says Florence of Worcester, "the sea came out upon the shore and buried towns and men very many and oxen and sheep innumerable." [24]

In neither of the sections was there any indication of the sea having ever before passed over the growing turf, although, from the numerous land-shells found *in situ* and in perfect preservation four or five feet beneath the pebbles, the turf must have been constantly growing on the bank from as far back as the commencement of the Christian era—and this agrees with my remarks on the antiquity of the fragment of an ancient bronze furnace discovered beneath this sand-bank (ante page 9).

Now if the sea a few centuries ago could in a large and open bay sweep over the whole of a long sand-bank, in some parts ten or fifteen feet above high-water and for centuries before always covered with turf and undisturbed by the waves, what would it not have done in funnel-shaped coves such as that of Lamorna? The effects of the earthquake-waves there on 1st Nov., 1755, have been already mentioned (p. 101). Vast masses of shingle have doubtless by similar means been often heaped up to a great height above the present reach of the waves, and, although the floors on which they rest have never changed their level, have been erroneously

[24] Trans. of Geo. Society of Cornwall, II. p. 139.

classed amongst "raised beaches." Even hurricanes coinciding with high tides must in funnel-shaped coves have raised beds of shingle many feet perpendicularly above the level of ordinary spring tides: and the lower tiers struck by the waves would act like wedges and lift the surface of the beds many feet beyond the height of the waves themselves. At the Land's-end, the spring tide rises ordinarily about eighteen feet, but when aided by strong winds, twenty-four feet; and the sea there has been known under most favorable circumstances of wind and tide to rise thirty feet.[25]

In several parts of St. Ives bay (particularly opposite Godrevy island on which a light-house has been lately erected) the calcareous sand is being converted into solid rock, and many houses in Gwithian are built with it. This lapidification is ascribed to the percolation of water holding in solution or suspension carbonate of lime, sulphuric salts, iron, alumina, and other mineral matter, proceeding from the strata through which the water had previously passed — different parts being indurated by different substances with which the water may be thus charged.[26]

I must not close this chapter without noticing Mr. Carne's valuable Paper read before the Royal Geological Society of Cornwall in 1818, and printed in its second volume, "On the relative ages of the Veins of Cornwall." "In this Paper," says Mr. Augustus Smith, M.P., in his address as president of the society in 1859, whilst dwelling on the great loss the county had sustained in Mr. Carne's decease, "were fully pointed out both the properties of these veins and their locality, first as contemporaneous with the *strata* in which they were found:—next, those of which the formation was doubt-

25 Drew's Cornwall, I. p. 541. The tide at the Land's-end flows northward eight or nine hours, and ebbs only from three to four hours.

26 Trans. of Geo. Society of Cornwall, I. p. 14; and Guide to Mount's-bay, p. 162.

ful as being contemporaneous or posterior to the rocks which contain them:—and thirdly, those which are generally acknowledged as *true veins*, especially lodes. The varied nature of these is very elaborately dwelt on; their character, courses, direction, and intersection minutely followed out, and more particularly as these are exhibited when veins of tin and copper are found more or less in contact. The whole were very fully illustrated by numerous diagrams. Under the second head the enumeration of granite-veins protruding through slate is full of interest and particular information, and in respect of which it is evident Mr. Carne had already arrived at the conclusion, confirmed by all subsequent investigations, that the protrusion of our granite bosses, forming the backbone of the county, is of an age subsequent to the slate as well as other *strata* now recumbent on their flanks, and of which the lines of contortion and inclination have more recently and minutely been mapped by Mr. Whitley's skill and pains."

Most of the facts noticed in Mr. Carne's Paper are gathered from the Land's-end and Lizard districts, where veins and rocks are very extensively exposed to view by natural sections of the cliffs.

The foregoing pages describing the antiquities and most remarkable geological phenomena of this district, will have prepared the reader for a walk round its coast. This pedestrian tour, with some local facts or occurrences worthy of notice, will be the subject of the next chapter.

CHAPTER XV.

PEDESTRIAN TOUR AROUND THE COAST.

In this interesting excursion the absence of trees almost everywhere will not be regretted, as the wide borders of the cliffs are generally covered with furze *(Ulex Europœus)* and heaths, which with their bright yellow and crimson blossoms, mingled with mosses and richly colored lichens on protruding rocks, delight the eye far more than artificial plantations. The wild thyme amongst other flowers is very luxuriant, and to its abundance the Land's-end honey is principally indebted for its far famed excellence. Besides the ceaseless sound of the waves which reaches the ear in two distinct tones —the treble and the bass—the former through the air the latter through the cliffs — we are often greeted with a laugh like that of man from a species of gull [1] performing its aërial evolutions over our heads, and occasionally, by way of contrast, we hear the piercing shrieks of the kestrel hawk—which disturbed by our approach is describing a vast circle over the sea, hoping ere it is finished we shall have gone sufficiently far to enable her to return to her nest in peace.

This walk along the cliffs is generally so remote from human habitations, so wild and fearful, that by some minds not a little fortitude is required to overcome the terror which the *genius loci* creates.

We commence our tour with St. Michael's Mount, which Mr. Davies Gilbert, some time president of the

1 "The laughing gull" is not the only species that utters a sound like the human laugh.

Royal Society, regarded as one "of the most extraordinary spots in the whole world."

> "St. Michael's Mount who does not know,
> That wards the western coast?"
> *Spenser's Shepherd's Calendar*, July, line 41.

When from a distance we view this pyramid of rocks with its broad and gracefully sloping base, we are struck with its beauty: when we walk around it, beholding its towering cliffs and lonely crags, we are equally impressed by its sublimity. The pictures of it by Turner and Stanfield, however beautiful in themselves, would hardly be recognised by those who live within sight of it. They who paint it truest praise it most, as Mr. Pentreath has done in his painting, recently engraved. The only way to its summit is on the northern side, passing by a deep well (which supplies the inhabitants all the year round with good water) and through what was, before the age of gunpowder, a strongly fortified gateway with loop-holes and embrasures, which, as well as a very picturesque granite sentry-box on the edge of the precipice, all possibly thousands of years old, are still in good preservation. A rude flight of steps inside this gateway leads by two batteries up to the only entrance into the castle, the most ancient parts of which are the doorway, guard-room, refectory, chapel, and tower over it. The refectory, where the monks assembled at their frugal meals centuries before it became the dining-hall of the military governor, is now called the *Chevy Chase* room, from having been nearly two hundred years ago fitted up with its present stucco frieze, representing the chase of the wild boar, stag, ostrich, and other animals. The famous *Kader Migel* "Michael's Chair" is nothing more than the remains of an ancient stone lantern on the S.W. corner of the battlements of the tower. The height of the chair from low-water is upwards of two hundred and fifty feet, and from it are seen the Atlantic, the Bristol, and the English channels,

with a most magnificent landscape. The pier, in 1425, opened towards the west, and was built by the inhabitants of Marazion assisted by a forty-days' indulgence granted by Edmund Bishop of Exeter to all who aided in its erection. It was very greatly enlarged three hundred years afterwards and the opening made towards the north, which entrance, in 1823, was much widened by the last Sir John St. Aubyn. In the top stone of the steps in the eastern arm of the pier is inserted a footstep of brass, where her Majesty placed her foot when landing at the Mount on 6th of Sept., 1846, and a metallic tablet commemorating the event is fixed in the wall close by it.

Having already considered the very ancient history of the Mount (pp. 6—14, 58, 59), I will now notice some facts of less remote date.

In the 11th century, Edward the Confessor finding monks there, gave them the Mount and other lands by a charter, translated in D. Gilbert's Cornwall, II. p. 209.

About 1085, William the Conqueror gave the Mount with the adjoining parishes of St. Hilary and Perranuthnoe to his half-brother (by his mother's side) Robert earl of Moretaigne, or Moreton[2] and subsequently earl of Cornwall,[3] who annexed the former to the larger Abbey of St. Michael *de periculo maris* in Normandy, to which it bears a very striking resemblance in form and situation.[4] His son, William

2 Moretaigne (vulgarly Moreton) is a little city about seven leagues from Avranches. *Polwhele's Cornwall*, II. p. 78.

3 The Earldom of Cornwall was made a Dukedom in 1338, by Edward III. in favour of his son the Black Prince, then only seven years of age. The Charter is copied in C. S. Gilbert's Cornwall, I. p. 414.

4 It continued so annexed until the reign of Henry V., when all alien priories were suppressed. The charter of annexation, signed also by William the Conqueror and his Queen, is copied in Oliver's Monasticon Dioecesis Exoniensis, p. 31. "Both mounts appear from the earliest period to have been fortifications as well as religious

earl of Moreton and Cornwall, endowed it with the town of Market-jew, whereof the proprietor of "the Mount is high lord to this day." [5]

In the 13th century a small Cistercian nunnery was appended, which lasted only fifty years.[6] "This nunnery" says Borlase, writing about a century since, "was lately standing on the eastern end of the monastery, with a chapel dedicated to the Virgin Mary, as in all Cistercian monasteries these chapels were.[7] The nunnery was detached a little from the cells of the monks, and much carved-work, both in stone and timber, to be seen a few years since, shewed that it was the most elegantly finished part of the house." [8]

In the Lincoln Taxation made in 1288 the Church of St. Illary is reckoned among the appropriations of the priory of St. Michael; and still earlier in Doomsday book this parish was taxed under the name or jurisdiction of *Lanmigal* (Michael's Church). This rectory continued to be annexed to the Mount until the days of Charles I., when the earl of Salisbury having sold the Mount reserved this rectory.[9]

Henry VI. gave the priory of the Mount to his new college (King's) in Cambridge but Edward IV. annexed it to Sion Abbey in Middlesex, under which rule it remained until the dissolution of monasteries by 27 Henry VIII., A.D. 1536.

houses, and to have contained garrisons as well as conventual buildings. It is remarkable, too, that the same tradition of extensive lands and forests submerged by the sea, is current of both." And each is an "insulated rock of granite." Ibid, p. 30.

5 Hals quoted by Tonkin, in Carew's Cornwall, by Lord De Dunstanville, p. 377.

6 C. S. Gilbert's Cornwall, II. p. 746.

7 Leland in 1540, thus speaks of the two chapels on the Mount, "on the *sowth* syde is *the chapel of S. Michael*, and yn the *east* syde *a chapel of our Lady*." *Itin.*, VII. 120.

8 Borlase's Antiquities, p. 351.

9 Drew's Cornwall, II. p. 320.

In 1471, John, the 13th earl of Oxford, an adherent to Henry VI., having fled from the battle of Barnet Heath, sailed from Wales to the Mount with some soldiers, and by artifice gained possession in the name of Henry VI. Edward IV. immediately ordered Sir John Arundell of Trerice, the sheriff, to besiege him, but Arundell and some of his followers were killed in the attempt. Edward then appointed John Fortescue, Esq., sheriff, who also made several unsuccessful attempts to take the castle. At length the earl and his followers on the promise of a free pardon yielded up the fortress.[10]

In 1646, Colonel Hammond and the Parliamentary forces took the Mount after an honorable defence by Sir Francis Basset, its governor. About 1660, the Basset family having suffered much in their property during the civil war, sold the Mount to Sir John St. Aubyn.[11] Six Sir John St. Aubyns successively have since been its proprietors—the last being the grandfather of Mr. John St. Aubyn one of the members of parliament for West Cornwall, who has occasionally resided there.

Marazion, the nearest place to the Mount, sent two members to parliament in the time of Henry II., but on the dissolution of the Priory of the Mount, it ceased to do so because it could not conveniently pay their wages, as appears by the Parliamentary Rolls in the Tower of London. "About 1513, this town was plundered and burnt by some armed men who landed there from a fleet of thirty French ships of war."[12] Its charter of incorporation is older than that of Penzance and St. Ives, and bears date 13th June, 1595. Here an excellent school-house with a dwelling

10 Hals, quoted in D. Gilbert's Cornwall, II. p. 182.

11 D. Gilbert's Cornwall, II. p. 213.

12 Carew's Cornwall, quotation from Hals by Mr. Tonkin, p. 378, and D. Gilbert's Cornwall, II. pp. 170, 171, 200.

for the master was erected and endowed in 1851 to the memory of Sir Christopher Cole, R.N., K.C.B., by his widow, Lady Mary Cole. Sir Christopher was a native of Marazion, and a member of parliament for Glamorganshire. "He acquired the highest military reputation by his capture of Banda in the East Indies, with a force several times less numerous than the garrison which he overcame." Through the exertions of his nephew Mr. John Griffith Cole, who led the way by a subscription of £500, which he afterwards considerably increased, and to which Miss James added a thousand guineas, the handsome Chapel-of-ease in Marazion was erected, and consecrated on the 24th of June, 1861. The mother Church of St. Hilary after its destruction by fire, as already mentioned, had been rebuilt a few years before, to which the Rev. Thomas Pascoe, the vicar, contributed five or six hundred pounds. This parish, which includes both Marazion and the Mount may have possessed the earliest church in Great Britain. See p. 59. See also p. 13. The preceding vicar of St. Hilary, the Rev. Malachy Hitchins, was the author of several Papers of much merit in the Philosophical Transactions and the Archæologia.[13] His son, Mr. Fortescue Hitchins of Marazion, wrote some pleasing poetry, and compiled the History of Cornwall edited by Drew. Marazion is also the birthplace of the late Mr. Pascoe Grenfell, "well known throughout England as an active member of parliament, as a man of talent and of great liberality, commensurate with his almost unexampled success in commerce."[14]

The sand-banks and remains of a "submarine forest" between Marazion and Penzance, and between Penzance and Newlyn, have been noticed on pp. 151—161. Seaward of the latter sand-bank and about two hundred and fifty yards below the western ex-

[13] Drew's Cornwall, II. 320.

[14] D. Gilbert's Cornwall, II. pp. 216, 221.

tremity of the marine promenade in Penzance was the shaft of the famous Wherry mine, dry at low-water, and having a boarded turret sufficiently high to exclude the sea at all times of the tide. Here in the six summer months of 1791, ten men working only six hours each tide, raised £600 worth of tin-ore—the chief adventurer and manager being Thomas Curtis, a laboring miner, born in Breage, ten miles from Penzance, but resident most of his life in Penzance. Induced by this success other adventurers joined him and erected a steam-engine above high-water mark, with a wooden bridge connecting it with the boarded turret: and £70,000 worth of ore was thus raised. The stage was then destroyed by a vessel driven against it in a storm.[15] The mine was resumed in 1836, and another steam engine erected with a similar wooden bridge extending to the same shaft, but not proving productive it was soon abandoned, and from the materials of the mine-buildings, the southern part of "Wherry Town" has been built as far as the large steam manufactory where the beautiful serpentine rock procured from the Lizard is polished and wrought into fonts, chimney-pieces, obelisks, candlesticks, bracelets, and other ornamental forms.

Pursuing our walk along the coast through the fishing-town of Newlyn,[16] we reach Gwavas battery with its furnace for making the shots red-hot. Here below the cliff, is another submarine mine worked by steam, called West Tolvaddon from its rich copper lode being considered a continuation across Mount's-bay of that at Tolvaddon, 4 miles N.E. of it. A little further on is Penlee[17] point—on which stands a pole marking the spot where the proposed Mount's-bay breakwater is to commence: and nowhere would a breakwater be

15 Trans. Geo. Society of Cornwall, I. p. 136.

16 *Nês* "nigh" *lyn* "lake." Leland calls Newlyn a "hamlet to Mousehole." *Itin.*, III. p. 5.

17 "The lesser head" or headland.

of more importance to the nation than in this bay. Stretching its arms S. and W. far out into the Atlantic, and thus commanding the English and Irish channels, Mount's-bay is the natural port or gate of all Britain, and during the prevalence of strong north-easterly winds, hundreds of vessels may be often seen here at anchor, unable either to weather the Lizard, or to pass round the Land's-end. It is nearer than any other British port to the Mediterranean, the East Indies, Australia, South America, the West Indies, the United States, and Canada. *Homeward* bound ships when they first make the land, are generally W. or S.W. of the Lizard, and could therefore enter this port earlier than any other: and few ports are so safely approached as this by day or by night. *Outward* bound ships, on the other hand, when they start from this bay, are as far advanced in their voyage as ships that had left *any* other port hours if not days before. Hence when the breakwater is made, the British merchants who make this bay the port for their homeward and outward bound ships will be always the earliest in the market, both at home and abroad, and their outward bound ships will always start with the latest possible telegraphic intelligence of the states of the foreign markets. Important as all these advantages are to owners of cargoes going to or coming from foreign countries, they are of far greater importance to *mails* and *passengers*, and to times of war than to times of peace.

Some may say that a harbour of refuge is not required in Mount's-bay, as Falmouth harbour, the best in England, is with a fair wind only a few hours' sail from it. But a few hours are often of great consequence to ships returning from a foreign voyage: and if the wind is not fair, they may after reaching Mount's-bay, be days or weeks trying to weather the Lizard before they can reach Falmouth, particularly in the spring, when easterly winds are so prevalent. At the public meeting for the breakwater, held at

Penzance on 12th June, 1857, over which Mr. T. S. Bolitho presided, Mr. Pearce (the best authority on the subject) stated from his experience of half a century, that large ships from abroad with valuable cargoes have frequently come so far into Mount's-bay as to be reported as arrived, but afterwards unable to weather the Lizard have been driven back to the very verge of soundings, and that scarce a year passes but vessels are sent to the chaps of the channels with provisions for homeward-bound ships detained there by contrary winds, many of which could have reached Mount's-bay.

Close beyond Penlee point is the very ancient town of Mousehole—a name originating as some suppose from the hole[18] or cavern in the cliff a little beyond its southern end: but "it seems most probable that 'the Mouse-hole' was derived from, instead of giving name to, the town. We are indebted to a friend for the following very possible derivation,—'môz-hel, or mouz-hel, the maid's brook or river:'"[19] there being a brook of clear water running through the town close to the very doors of the women who use it. It was also called *Porth Enys*, "the island haven" from the neighbouring small island of St. Clement, which Leland, in 1540, described as "a lytle low island with a chapel yn yt, and this lytle islet bereth gresse."[20] Mousehole was a market-town as early as 1292, and a new quay was built there about 1392,[21] to which a northern arm was added about twenty years since, for the protection of its very numerous fishing-boats.

18 This hole "at the entrance is about 50 feet high, and 80 wide —at the depth (or length) of about 100 feet, the cavity becomes very small, but on passing this strait it again widens and extends nearly 50 feet farther: in the largest part the roof consists of angular stones and gravelly clay, but towards the end it is entirely disintegrated granite." Trans. Geo. Society of Cornwall, III. p. 226.

19 Guide to Penzance, by Mr. Courtney, pp. 79, 80.

20 Itinerary, VII. p. 119, and III. p. 5.

21 Lysons' Cornwall, p. 254.

This town has attained some celebrity as the place where the Cornish language was last commonly spoken, and where Dolly Pentreath was born and lived a hundred and two years, who having been "sent with fish to Penzance when twelve years old, sold them in the Cornish language, which the inhabitants in general (even the gentry) did then well understand." She was probably the last survivor of those who had in their youth ordinarily conversed in Cornish, although doubtless after her death many who had gathered up fragments of the language repeated them for the amusement of their friends.[22] Her maiden name (Pentreath) she retained after marriage—a custom not yet extinct in Mousehole, but the Clergyman who buried her, not sanctioning this usage, registered her burial at St. Paul in these words, under the year of our Lord 1777 :—

"Dorothy Jeffery was buried December 27." Under this entry is the following interlineation :—"This is the famous Dolly Pentreath (her maiden name) spoken of by Daines Barrington in the *Archæologia*." No monument was erected to her memory until 1860, when an obelisk of smoothly-cut granite, rising six feet and a half above the ground, was placed in the wall of the Church-yard, having a Maltese cross (with its extremities rounded so as to be parallel with the ring which circles it) on the top of each of its four sides, and bearing on the side facing the road, the following inscription,—"Here lieth interred Dorothy Pentreath, who died in 1778, said to have been the last person who conversed in the ancient Cornish, the peculiar language of this county from the earliest records till it expired in the eighteenth century in this parish of Saint Paul. This stone is erected by the

22 See Polwhele's Cornwall, v. pp. 16—20, where the subject is very fully discussed.

prince Louis Lucien Bonaparte, in union with the Rev. John Garrett, vicar of St. Paul.

"June, 1860.

"'Honour thy father and thy mother; that thy days may be long upon the land which the Lord thy God giveth thee.' *Exod.* 20, 12.

"'Gwra perthi de taz ha de mam: mal de Dythiow bethenz hyr war an tyr neb an arleth de dew ryes dees.' *Exod.* 20, 12."

It is stated by Polwhele and others as well as in this inscription, that she died in 1778: but she was buried on 27th December, 1777, as appears by the above extract from the register. Possibly the entry may have been made according to the old style—which would be January, 1778, according to the new.

What connexion the 5th commandment had with her longevity we are not told. The vicar most probably seized the occasion of a centenarian's death to draw attention to a commandment now too generally regarded as obsolete and as more honored in its breach than in its observance.

A far more worthy native of Mousehole is Richard Trewavas, who having lost his father at an early age was placed at the parish school of which Alexander Rowe, distinguished afterwards as a mathematician and astronomer, was then master. But on the second marriage of his mother he was taken from school and with his step-father engaged alternately in fishing and smuggling. In the twentieth year of his age, when returning from France on a smuggling expedition with five companions in a boat of only twelve or fourteen tons burden, they were overtaken by a storm, during which none of them expected ever again to see the land. From thenceforth he relinquished that lucrative but unlawful employment,[23] and his step-father and

23 The daring character of the smugglers in Mount's-bay about that period, and the battery erected by them in Prussia cove near Marazion, are fully recorded in Osler's life of Lord Exmouth, p. 386." *Wallis' Corn. Reg. p.* 122.

mother having urged him in vain to resume it, turned him out of doors. Four or five years after this unnatural treatment his life was preserved in an almost miraculous manner by his fidelity to his word. Long before his appointment as pilot to the British navy he assisted in piloting vessels into Penzance quay. "I was reading a book" he says "which I had borrowed and had promised to use with great care, when the sound of 'a ship in sight' caused me hastily to put the book into my pocket, and springing into the boat with seven other men, I threw off my coat. But hearing the book strike against the side of the boat, I was reminded of my promise and immediately left the boat, ran home with the book and then returned. I found to my grief that another man had taken my place and the boat was gone. They had not proceeded far when they found that there was no ship, and as they were returning a hollow sea rose very quickly, broke on the boat's quarter, and completely swallowed her up. Six out of eight were drowned." He greatly distinguished himself as King's pilot when the British fleet was pursued up the English Channel by the combined fleets of France and Spain, particularly on one occasion when in a small revenue cutter he safely delivered some important dispatches to the British fleet notwithstanding the fire of the enemy. On another occasion "when the Dolphin cutter lay about a mile from Mousehole, I went on board" he says "to get her underweigh as fast as possible; for a French lugger five or six miles off had just taken two English brigs. I found the captain and chief mate were both gone into the country and about thirty of the crew were gone to their families on the coast. I then took with me about twenty-eight fencible fishermen and got underweigh; but the darkness of the night coming on prevented our taking her; however we recaptured a large brig loaded with corn from Yarmouth." He was respected on board the numerous ships that he

piloted, not only for his nautical knowledge and acquaintance with the coasts for which he was pilot, but also for his general information and intelligence, for his gentleness, humanity, firm moral conduct, and unassuming piety. His Christian conduct and gentle demeanour won the affections of many officers. The purser of a ship which he had piloted, having a strong desire to quit the company of the dissipated and to reside near his old pilot, came to Mousehole and dwelt there all his remaining life, for many years of which he had the happiness of seeing his aged friend visiting the sick, and procuring for them pecuniary aid from his wealthy neighbours of all denominations, by whom his truly catholic spirit and his qualifications as an almoner were so justly appreciated that they allowed him to give of their abundance to any extent he thought proper. This office of receiving the bounties of the rich and distributing them amongst the poor was to him a source of unspeakable gratification—for if it be *blessed* to receive and *more blessed* to give, it must be *most blessed* to be both receiver and giver—and it was with this feeling probably when a poor widow thanked him for the charities she had received at his hands that he said, "you had the substance but I had the essence." A faithful portrait is prefixed to Treffry's Memoirs of him, from which I have derived the above particulars. He died in 1823, aged 73, and was interred in the new burying-ground of St. Paul.

St. Paul appears to be the only church wherein any inscription in the Cornish language now exists. It is on a handsome mural tablet to Captain Stephen Hutchens, R.N., who died in Jamaica, A.D. 1709, leaving £600 for building and endowing an almshouse,[24] and for repairing the church there. It reads *literatim* as follows,—

24 Lysons' Cornwall, p. 256. The revenue from the lands purchased are now about £150 per annum.

Bounas heb dueth Eu poes karens wei
Tha Pobl Bohodzhak Paull han Egles nei.

which a friend has freely translated thus,—

"Eternal life be his, whose loving care
Gave Paul an almshouse and the church repair."

A less elegant but more literal translation is the following,—

Life without end be thine whose love did fall
On the poor people and our church at Paul.[25]

This church is not dedicated to the Apostle, but either to St. Paulinus the first Archbishop of York, or to St. Paul the first bishop of St. Pol de Leon in Brittany, a Cornishman celebrated as a founder of monasteries, who died about the year 573. It was burnt by the Spaniards in 1595. It is only during the present generation that "Saint" has been prefixed to the name of this church.[26]

Half a mile N.N.W. of it, where the road from St. Paul joins that from St. Buryan to Penzance, there is by the road-side a granite stone smoothly cut into the form of a sugar-loaf, marking the spot where a gold ring was found in 1781, three inches and a half in diameter, with the words,—"In hac spe vivo" engraved thereon, as recorded on a slab fixed close by it. Within a mile probably from this spot "in 1783, one of the ancient British ornaments of gold, in the form of a crescent, with a narrow zigzag pattern slightly engraved on it, was discovered near the remains of one of the circular earthworks in the neighbourhood of Penzance," an engraving of which is given in Lysons' Cornwall, p. ccxxi. The ring and the crescent were in the possession of Sir Rose Price.

After passing *Kimyell-dre, Kimyell-cries,* and *Kim-*

[25] For the English part of the inscription on the tablet see Polwhele's Cornwall, v. p. 43.

The Cornish motto of the Polwhele family is worth remembering —*Karenza whelas karenza*—"Love worketh love."

[26] D. Gilbert's Cornwall, III. pp. 284, 285.

yell-wartha ("Kimyell-town, Middle Kimyell, and Higher Kimyell"),[27] we reach *Carn du*, "black rock," the eastern point of *Lamorna*[28] *cove*, from the quarries of which thousands of tons of fine granite are annually brought to Penzance for exportation, Dover being now the chief place to which they are carried for the harbour of refuge now being built there. A noble obelisk from these quarries, twenty-four feet and a half long, was exhibited at the Crystal Palace in 1851. Very large crystals of felspar are occasionally found in this granite, some four inches and a half by two inches and a half. The effects here of the earthquake of 1755, are mentioned on p. 101.

Two or three furlongs beyond the cove is the remarkable headland of Carn Barges[29] so well fortified by nature that had it been sufficiently extensive it would doubtless have been a cliff-castle. Upon its summit is a massive pedestal on which stands a granite slab nine feet high, eight broad, and between two and three feet thick, with its face seaward. As Borlase does not notice this mounted slab in his Antiquities, he probably regarded it as a *lusus naturæ*. But that it was a seamark erected for the ancient tin-ships which annually came hither from the Mediterranean, seems to me much more probable than that the "pensile monument" of Carn Boscawen,[30] a mile farther on, was the work of the Druids as imagined by Borlase.[31] This "pensile monument" is a third of the way down from

27 Kimyell-wartha was the seat of the Kimyell family, whose heiress married Sir Geffrey St. Aubyn of Clowance, in the 14th century, whereby the manors of Kimyell and Busava became and still belong to the St. Aubyn family, which came over with William the Conqueror. *Lysons' Cornwall*, pp. XCII. and 255.

28 *Mor* "sea" *na* "that."

29 *Barges* is the Cornish for kite, and no spot in this district is more frequented by kites and hawks than this carn and its immediate neighbourhood.

30 *Bos* "house" *scawen* "elder tree."

31 Antiquities, p. 168.

the top of the carn, on the side facing the Logan-rock, and consists of a slab twelve or fourteen feet long resting on three massive pillars, each about twenty feet high. Two of these pillars have fallen from their perpendicular positions in different directions, and are leaning against other rocks, so that the slab with its supporters, when seen from the south-west, resembles an inverted delta (▽).

At Carn Silver, half-a-mile east of Carn Boscawen, is the patch of slaty felspar rock in Rosemodris cliff mentioned on p. 150. Here a vein "may be traced from the slate *into* the granite mass—the only instance (known to Mr. Carne) of a granite vein penetrating both the slate and the granite."[32] Immediately westward of Carn Silver is a cliff cave "about 70 feet high, 20 wide, and 30 long: in the end of it is a mass of bowlders and pebbles 8 feet wide and 12 feet high:"[33] shorl-rock veins are in the cliff. At Carn Boscawen there is a vein of shorl-rock about eight feet wide, bearing N. and S., and forming a very prominent object in the almost perpendicular cliff, being visible

32 Trans. Geo. Soc. of Corn., II. p. 70.

33 *Bowlders* are the larger, *pebbles* the smaller, rounded stones—none of which could have been *originally* where they are *now* found. We passed some other caves which I forgot to notice in their places. A mile south of "the Mouse Hole," on the north of Kennal point (north of Carn du), is a cave "about 100 feet long, 30 wide, and 40 high—at the mouth, the roof is formed of angular granite stones and clay; in the middle, of solid granite, and at the end is a vein which contains iron." Between that cave and Carn du is a "stratum of bowlders at least 100 feet long and from 3 to 8 feet thick; the cliff, composed of angular fragments and clay, rises 30 feet above it." The arched roof of a small cavern in the western side of Lamorna cove is full of immense bowlders 10 feet above the highest tide, "many of them apparently ready to drop." "There are two other small caverns on the western side of Lamorna cove with bowlders in the roof." A cave a little eastward of Carn Barges is about 60 feet long, 40 wide, and nearly 20 high; its roof consists of a mixture of bowlders and angular fragments about 20 feet above the level of high water.—Trans. Geo. Soc. of Corn., III. pp. 226, 227, 234, 235.

to the height of perhaps sixty feet, and consisting principally of quartz and shorl and in some parts containing decomposed mica, "which appears to supply a satisfactory proof of what Dr. (now Sir John) Forbes has surmised—that shorl-rock is rather a variety of granite than a distinct rock." Shorl "is so common in the granite of this district that it may be almost deemed one of its essential ingredients: it is however very unequally distributed: it sometimes occupies the entire place of the mica, and sometimes accompanies it: in some places it occurs in slender prismatic crystals mixed up with the other parts of the granite, and in others the crystals are found in separate bunches, frequently so disposed as to radiate from a centre. Granite of this kind abounds in Bosava in Paul," where there is a course or channel of granite entirely different from that of the adjoining country: in some parts it appears to consist of quartz, shorl, and mica, and to contain no felspar: another variety exhibits shorl, felspar, and mica, with scarcely any quartz: it possesses almost every shade from greyish and brownish white to deep red: and "if the beautiful granite of this spot were generally known, it would probably be much used for ornamental architecture: it has been seen 10 feet below the surface, where it is found in irregular laminæ much like the common elvan stone: and indeed this is almost the only circumstance in which it resembles the porphyritic elvan of the mining district: it is for the most part equally tough, and as easily wrought, as other granite." [34]

From the estate of Boscawen-rose, of which Carn Boscawen is part, and to which the family of the Boscawens can be traced up to the year 1200, Mr. Hugh Boscawen, of Tregothnan, was in 1720 created Baron Boscawen Rose and Viscount Falmouth.[35]

[34] Trans. of Geo. Soc. of Corn., III. pp. 212, 243.

[35] Lysons' Cornwall, p. LXXV.

In the adjoining cove of St. Loy there stood near the edge of the cliff the remains of an ancient Chapel with a stone altar until the last few years, when the occupier of the farm removed them without permission from the proprietor.

St. Loy, or Eloy, is the bishop whose festival in the Romish Calendar is 1st December. A little eastward of the stream in the middle of this cove is a stratum of bowlders "at least 150 feet long and from 4 to 8 feet thick, interrupted in the middle by two protuberant masses of granite: the ground above the bowlders is 30 feet high: at high tides the sea reaches the foot of this bed." [36] We ascend from this cove by a road overhung in summer with thick foliage, to the mansion house of Boskenna, the residence of Mr. Bevan the County Court Judge of this circuit, and the property of Mr. T. Paynter, one of the police magistrates for Westminster. Mr. John Paynter, the former proprietor, was so well acquainted with the laws and constitution of his country — so active, able, firm, and judicious a magistrate — so qualified by reading and visiting other countries for legislative duties, and had at the quarterly meetings of our county magistrates, as well as at numerous special county meetings on occasions of great public interest, manifested such general knowledge, talents, and judgment, expressing himself with such classical and manly eloquence, that the Whigs often mentioned him as a fit person to represent them in parliament, and but for his premature death he would now most probably have been one of the members for West Cornwall. He was the first President of the Penzance Natural History and Antiquarian Society, and continued president until his death in 1847, when he was succeeded by Mr. Carne.

Both Boskenna and Boscawen-rose are in the parish of St. Buryan, and so are Burnuhall and Pendrea, one

[36] Trans. Geo. Soc. of Corn., III. p. 234.

of which two last villages (most probably the latter) is the birth-place of William Noye, the well-known Attorney-General of King Charles the First.[37] Leland, speaking of this parish, says,—"S. Buriana an holy woman of Ireland sumtyme dwellid in this place, and there made an Oratory. King Ethelstane goying hens, as it is said, onto Sylley and returning made *ex voto* a College wher the Oratorie was. King Ethelstane, Founder of S. Burien's College and Giver of the Privileges and Sanctuarie to it." [38]

Secular canons (as appears by Domesday Survey) were in St. Buryan church at the time of the Conquest. When the Lincoln taxation was made the establishment consisted of a Dean and three Prebendaries, which continued till the Reformation.[39] The deanery includes also the two adjoining parishes of Sennen and St. Levan, and until 1858, when the Probate and Letters of Administration Act came into operation, was a "Royal Peculiar and Exempt Jurisdiction." The present Dean —The Honorable and Rev. Fitzroy Henry Richard Stanhope—was appointed in 1817. "The dean receives institution from the Prince of Wales and Duke of Cornwall as his ordinary, though the patronage has often been exercised by the Sovereign *vacante ducatu.*"[40] The church of St. Buryan fifty years since possessed a very handsome screen and rood-loft, some remains of which are still to be seen there, as well as the door-way and steps in the southern wall that led up to the loft. The church stands on very elevated table-land, and from its tower, ninety feet higher, is a most magnificent land and sea view.

37 D. Gilbert's Cornwall, I. pp. 143, 147, and III. p. 143. Lysons' Cornwall, p. 50.

38 Itin., III. p. 5.

39 Lysons' Cornwall, p. 49.

40 Dr. Oliver's Monasticon Dioecesis Exoniensis, p. 7.

This church — "*ecclesia Sancte Beriane in Cornubia*"—was charged with the annual payment of a hundred shillings, "*Monachis de Sancto Matheo de Finibus-terrarum in Britannia*," to the monks of St. Mathew of the Land's-end in Britannia.[41] Bishop Tanner, however, imagining that Britannia here signified Britain,[42] vainly sought for some monastery in England dedicated to St. Mathew. But "when it is once understood that, in the Records, Britannia always means Brittany or Bretagne, no doubt can remain that the monks of St. Mathew *de Finibus-terrarum*, were those of the ancient Benedictine Abbey of St. Mathew at the most western extremity of Brittany." These remarks I have gathered from an elaborate and able article in "Notes and Queries" for 13 and 20 April, 1861, pp. 281, 301, by my friend "H. P.," who has also given very satisfactory reasons for the grant. In a note he adds,—"The department of Finistère" (the most westerly part of France and, like our own Land's-end district, bounded on three sides by the sea) "comprises very nearly the same portions of the Province of Brittany as had belonged to the dioceses of St. Pol de Leon and Quimper, which again answered respectively to the ancient districts of Leonois and Cornouaille. The juxta position of these names is noteworthy, and almost leads one to suspect that the strange tradition respecting the Cornish "*Lionesse*," may have originated in some Breton legend." The tradition referred to is that of the submersion of a tract of land called "*Lionesse*," containing one hundred and forty parish churches between the Land's-end and the Scilly Isles. But this I take to be a mere *local* appropriation of the ancient

41 The first printed copy of this grant appears in vol. i. of the *Charter Rolls* (1837): it is cited also on p. 409 of Dr. Oliver's *Monasticon Dioecesis Exoniensis*.

42 This error of Bishop Tanner has been repeated by the last editors of Dugdale's *Monasticon Anglicanum* (1849), VI. pt. 3, p. 1616.

general tradition, that a large island or continent between Europe and America has been submerged in the Atlantic.

Five furlongs E.S.E. of the church, on the estate of Bosliven are the remains of an ancient building called the *Sanctuary*, close to a small stream separating that estate from Tregadgwith. These probably formed part of a chapel or baptistery, to which the privilege of Sanctuary conferred on the mother church might have extended. The western wall is about ten feet high and twenty feet long—the northern wall about sixty feet long, and only six feet high: the other two walls are entirely gone. A neighbouring farmer shewed me what seemed at first a stone trough fixed in the bottom of the northern wall near its eastern extremity: one end of this hollowed stone projected into the interior of the chapel with that end of its surface barely above the floor: on removing its contents, however, we found it was not a trough but a gutter, three feet long, tapering internally from a breadth of one foot eight inches, to about eight inches wide, and so inclined as to carry water rapidly through the hole made for it in the wall into the open space outside. In the same wall an internal channel extended from the hole two or three feet upwards inclining towards the west and terminating where many stones have been removed, and where possibly (notwithstanding the singularity of the position) a font may have projected, the waste water from which might have flowed down through the channel into the gutter—the channel, the hole, and the gutter, being all apparently coeval with the wall itself. The remains have continued in their present state more than forty years. When Lysons visited the spot about fifty years since the four walls were probably standing, but he makes no mention of the gutter.

The nearest way from the Sanctuary to Penzance is through Tregadgwith—but by taking the southern

road we may pass through the Druidical Temple of *Dawns myin* (p. 15), by the *ménheer* "long stone" west of it, the "holed" stones north and south of it, the two *myin heerion*, called the Pipers (p. 16), and the *Fowgow* "cave"—in the description of which last on p. 46, I omitted to state that besides the entrances to the main and branch caves, there are apertures at the opposite ends. On the hill-top, within a mile E.N.E. of the Fowgow is a very ancient stone enclosure called the "Roundago," in the estate of Castallack. There is another a mile north of that in Castallack, at Kerris (pp. 16, 39). Three-quarters of a mile north-north-east of the last are the remains of an ancient "Round" or circular earth-work enclosing an eminence, in the estate of Tredavoe: within the enclosure are two large slabs standing by themselves, like those in the Crellas (p. 48), which may have been the door-way into an inner circular enclosure not now existing. A quarter of a mile south-east of this Round is the huge mound of earth a furlong or two in length, the beginning of a wall which Sir Rose Price intended to have completed round a house he purposed building. The land and sea views from all these elevations are very extensive, and the walk through the fields from Tredavoe village towards the east-north-east, although scarcely known to the inhabitants of Penzance, is on approaching that part of Newlyn which faces Tolcarn rocks, one of the most beautiful in Mount's-bay.

We next visit Penberth cove with its picturesque fishing-village at the mouth of a pretty valley, through which runs a crystal stream well supplied with trout. Near its *eastern* headland is a cave with "a very small entrance, but larger within: its roof is low but finely studded with bowlders."[43] After ascending its *western* headland we soon reach the Logan-rock, within the cliff castle described on p. 40. Although this is the

[43] Trans. Geo. Soc. of Cornwall, III. p. 227.

most remarkable detached block of granite in this district, it is not half so striking an object as the *Tolmên*, another block of granite about thirty-three feet long, nineteen wide, and fifteen high, resting on a very elevated inland carn eighteen miles east of Penzance, and resembling an egg, with its ends pointing due north and south. The "hole" from which the *Tolmên* derives its name, and through which a man can walk in a stooping posture, is not in the rock itself, but between the two points on which it rests, as in the engraving before us. Borlase's drawing was taken from the east,—my nephew's in 1849 was from the west-north-west. The Logan rock was estimated by Dr. Macculloch, at about sixty-five tons—the *Tolmên* is eight or ten times that size. In reference to the former, Borlase says "it is morally impossible that any lever or indeed any force (however applied in a mechanical way), can remove it from its present situation."[44] This alleged moral impossibility may have prompted the late Lieut. Goldsmith, when commanding a revenue cutter on this station, to make the attempt, and he succeeded with his crew in "logging" it from off its ancient resting-place: but an adjoining rock kept it from going over the cliff. This occurred on the 8th of April, 1824. On the 2nd of November in the same year, it was replaced by machinery from the Devonport dockyard, and it may now be logged again, although not so easily as before.

The cliff-scenery of the Logan-rock, the Land's-end, and the intermediate coast is considered the finest in Britain. The granite here (says Mr. Carne) "generally assumes a prismatic form, but is frequently divided, both perpendicularly and horizontally, into quadrangular and even cubical masses. The finest specimens of the prismatic granite occur on the northern and southern sides of the Land's-end and on the rocks east

[44] Borlase's Antiq., p. 170.

of Carn Barra. Castle Trereen, on which the Logan-rock stands, and several of the smaller neighbouring headlands, afford very fair specimens of the division into quadrangular masses. The principal spot where the prismatic and the cubical forms are united are Pordenack point, Carn Evall (Voel), Pellitrass point (north of Guethenbrâs), and Chair-ladder and also the summit of the Land's-end itself. At Pordenack point the masses of granite bear a great resemblance to basaltic pillars (although far larger), not only in their prismatic form, but in the apparent regularity of their sides and their division into joints: the same resemblance occurs on the summit of Carn Evall (Voel) and on many other spots."[45]

Half-way between the Logan-rock and Porth-curnow cove is a high narrow cavern. *Porth-curnow* signifies "Port Cornwall." Its beautifully white sand is a striking object from the Logan-rock. Having filled a bag with the skimmings of the little ridges left by the retiring tide when the sea is smooth we may at our leisure, with the assistance of a lens, separate the perfect shells from the fragments.[46] Instead of walking by the edge of the cliff from this cove to Porth-chapel, we may go by the way of St. Levan Church, a very picturesque old building containing much ancient carved work, with a stoop in its porch and some ancient crosses in its churchyard, the eastern stile of which has a coffin-shaped *lich* stone, whereon the corpse is placed prior to the funeral service. The *lich* stone in the stile of St. Buryan churchyard is rectangular. In descending the hill facing the south side of St. Levan Church tower, a shout would be answered by a remarkably clear echo from it, at the distance of about

45 Trans. Geo. Soc. of Corn., III. p. 208.

46 At the Museum of the Penzance Natural History and Antiquarian Society is a collection of about a hundred and fifty species from this cove.

the cliff. A large metalliferous vein crosses the cavern from east to west. A smaller cavern east of the Funnel bears the name of the *Little Funnel*, as it is also open to the top of the cliff: a vein crosses this cavern also." [50] "It is possible but by no means easy at low-water to descend to the entrance of the cavern and explore it; [51] but it is far more interesting to behold from the lowest part that can be reached with safety the rocky headlands on each side; one of them, near the entrance to the cavern, called Chair-ladder presents perhaps the finest specimen of columnar (we had almost said basaltic) granite that is to be seen on this coast; the resemblance to basalt is not confined to its columnar form, but it has also the same jointed appearance. We do not hesitate to describe the rocks of Tol-Pedn-Penwith as the finest and most interesting on the western coast. The granite here is very porphyritic and most of it contains pinite; the geologist will observe that it is frequently intersected by veins of a different kind of granite, some contemporaneous—others of more recent formation; in most of these veins the felspar is very red: many are also quite decomposed." Tol-Pedn-Penwith is the farthest

50 A similar hole effected by similar agency during the lapse of ages was suddenly completed near the Lizard Lighthouses so recently as the night of 19 Feb., 1847, and without any previous warning, by the falling in of part of the roof of a horizontal cavern. Its depth at first was only forty feet, but in a few months, the debris being washed away by the waves, it increased to more than sixty feet. This hole, which is called *the Lion's den*, is nearly fifty feet broad and its edge about twenty feet from the brink of the cliff. (*A Week at the Lizard*, by the Rev. C. A. Johns, p. 16.)

51 "Some time since two gentlemen from London entered the cavern and became enclosed by the tide. One who excelled in swimming fortunately got out and communicated the perilous situation of his companion to a neighbouring farmer who hastened with ropes to the spot and succeeded in lifting him to the surface."—(*Guide to Penzance*, p. 130.) Had the gentleman waited a few hours for the tide to retire, he could have returned by the way he entered.

This funnel appears to have been the very last place in the Land's-end district where the Cornish chough used to build.

visible point westward from the Lizard and might therefore have been called *Penwith*, "the head of the break or separation."[52] The farthest point that can be seen westward from Tol-Pedn-Penwith, is *Guethensbrâs*, which (as *guethen* or *gwyth* is identical with *with*) signifies the "great break." The next great headland northward is *Carn barra*, "the great carn," *barra* being doubtless the same with *brâs*. The farthest point northward visible from Carn barra is Pordenick, the finest of all the headlands from Tol-Pedn-Penwith to the Land's-end. Between these headlands of Carn barra and Pordenick point are *Carn les boel* and *Carn voel*, two other headlands projecting so little compared with the former that their terminations *boel* and *voel* (different spellings of the same word, *b* and *v* being interchangeable letters as will hereafter be shewn) signify merely "a cliff." *Carn les boel* is nearly midway between the great headlands of Carn barra and Pordenick; and *les* or *liz* means "a gulf of water between two headlands." These names, therefore, as is usual in this district, are very descriptive of the localities.

After visiting Guethensbrâs, Pellitrass point (p. 187), and Carn barra (p. 187), and passing Pendower cove, in which is a large cavern inaccessible from the land, we reach the isthmus leading westward to Carn les boel. In the southern corner of this isthmus, and on the sea side of the narrow path on the cliff, are two or three rocks resting on one another, the uppermost being a logan rock fifteen feet long, six high, and seven broad, so nicely poised that a child can easily log it: this vibratory property however is not apparent until you descend and push upward its southern end. North of Carn les boel is Mill or Nanjizal bay, wherein are four cliff caverns noticed by Mr. Carne, and the remains of some rude machinery for raising sea-weed up a fright-

52 Pryce imagined this breach or separation to be "as the Land's-end is from Scilly."

ful precipice. A large bucket when filled with water descended to the beach and by its weight drew up a cage filled with sea-weed to a platform projecting over the cliff. A farmer in the neighbourhood informed me that he once got into this cage to be drawn up; but the man on the projecting platform had not hold of the rope which regulated the descending bucket, and he was therefore carried upwards with such velocity that were it not for his presence of mind in throwing himself from the cage when only a few feet from the ground, he would have been dashed to pieces on reaching the platform. Near it is a capstan for drawing up boats close by a strange-looking rock in the form of a huge wedge resting on its broad end and rising high above the beach. North of the fine headland of Carn voel (p. 190) is Lion's-den cove, so called from the cavern therein.

On Pordenick point are remains of buildings formerly occupied by the Coast-guard. The columnar character of the rocks on its southern side is very striking (p. 187). Huge masses of granite are piled upon one another to enormous heights with almost the regularity of masonwork. One of these natural columns of jointed blocks is capped by a small rock poised on so minute a base, that we wonder how it could occupy for a moment the position it may have held ever since the deluge: and the same rock is apparently so inaccessible, that our wonder is lost in astonishment and painful apprehensions when (as is often the case) we behold a man standing on its very summit.

The islet two furlongs northward, which is entirely perforated by a lofty archway, is called *Enys dodnan*, "the isle with soil or grass." It has another cavern but not completely through.

We now arrive at that part of the Land's-end cliff on which, to the great annoyance of lovers of fine scenery, buildings have been erected for the refresh-

ment and accommodation of visitors and their horses. Here, as well as from numerous other heights already visited, the vast expanse of ocean "is at all times a grand spectacle: it is terrible when a fierce westerly gale levels before it the whole floor of the sea, driving forward one blinding sheet of foam, even to the summit of the Land's-end precipice: but it is yet more solemn in its quieter mood when with little wind stirring, the vast billows, propagated from some centre of storms far in the Atlantic, come slowly to break on the rocks in measured cadences of thunder, the very types of enormous power in repose."[53] From hence at low-water is a fine view of the Wolf[54]—a dangerous half-tide rock of greenstone, eight miles distant towards the south-south-west: a lighthouse will soon be erected thereon in place of its present beacon—the preparation of the granite blocks for that purpose having already commenced. Here too, in clear weather, the Scilly Isles can be distinctly seen towards the west-south-west, although St. Mary's, the chief of them, is twenty-three miles off. The light-ship also at the Seven-stones can be seen sixteen miles towards the west: this light-ship was first placed there in 1841: it has been driven twice from its moorings (forty fathoms deep), but at length rides securely in one of the most singular and exposed situations throughout the British seas: the crew con-

53 Quarterly Review for Oct., 1857, p. 302.

54 By other nations it was called the "*gulf*" rock. This conversion of W into G is very common. Thus *war* is changed into *g*uerre, *W*illiam into *G*uillaume, *W*ales into *G*alles, *W*allia into *G*allia. The original word in each instance was probably Celtic and began with a W, so that *W*ales or *W*eales, and not *G*alles or *Gaël*s or *G*auls was the original name of the inhabitants of France as well as of Great Britain, which were both peopled by the *Celts*, and the corruption of the Celtic letter *W* into *G* necessarily followed when Gaul adopted the language of their Roman conquerors, who had no W in their alphabet; whereas the Celts having both W and G needed not have corrupted any of the above words from whatsoever language they may have been derived.

sists of eleven persons on board and five on shore.[55] The Longships lighthouse, a mile and quarter west of the Land's-end, is sometimes for months together inaccessible. Although it rises one hundred and twenty feet above the mean level of the sea, "the building is often entirely hidden for some seconds by the sea mounting over all and breaking many fathoms above the lanthorn: this more frequently happens in calm weather and previous to a gale, when the heavy ground seas striking against the rock, rise in a body without breaking, and fall again perpendicularly."[56] Four men in rotation dwell on the rock, three being always there and one on shore. The snow-white dwellings lately erected for their families, and crowning the hill-top above Sennen cove, are within sight of the lighthouse. "Longships" is the literal translation of *naves longæ*, the name given by the Romans to their ships of war, and the rocks were probably thus called from their resemblance to such ships at a distance.[57] They consist chiefly of granite, but the rock on which the lighthouse stands, *Carn brâs* "the great carn," is part of the patch of slate that runs out from Sennen cove: and its top is the same height above the sea as the very lowest part of Peal point (the true Land's-end), to which visitors descend—in other words this lowest part of Peal point, the top of Carn brâs, and the horizon are in the same straight line.

Peal point is the name of the group of rocks forming the extreme point of the Land's-end, and we descend to it by a narrow isthmus. Over the precipice, at the highest part of this isthmus, in 1804, General Sir Robert Arbuthnot (then a Captain in the Dragoons) narrowly escaped falling. He had (contrary to the common narrative of the accident) *led* his horse, a spirited

55 Corn. Reg., pp. 100, 472. 56 Buller's St. Just, p. 57.

57 For the same reason, some rocks near the Lizard are called the "Man-of-war rocks."

animal, *down* the steep descent, while his two companions had *ridden* theirs. In returning he thought he might also safely ride. Unfortunately the girths went back, the horse kicked and plunged and fell over the fearful precipice, the Captain throwing himself off when only four feet from the edge.[58] From the rock on which the horse was precipitated, and which is washed by the sea, "the granite cliff exhibits one of the finest instances of the columnar form which the Land's-end affords." This rock lies at the southern extremity of a lofty natural archway (called the Land's-end hole) extending across the isthmus. The archway "is probably 200 feet in length: at the entrance from the north it is perhaps 60 feet high, but in the middle (where the roof is studded with bowlders and pebbles) not more than 30. The floor is strewed with large masses of granite never covered by the regular flow of the tide." By lying down on a rock projecting from its lower side at the northern entrance, and thrusting your head and shoulders over the frightful precipice, you can obtain a good view of this magnificent natural excavation. A little lower down, towards the west, the isthmus is perforated by another grand archway "about 150 feet long: at its entrance from the north the roof is low but at the southern extremity it is 60 feet high and 30 wide."[59] Mr. Carne also notices other excavations within two or three furlongs north of those now described: the one nearest to Maen castle called the Gamper hole "is about 20 feet wide and 30 feet high at the entrance and about 40 feet" long: its walls "are solid granite and on them rests an arched roof of granite bowlders connected by gravelly clay: several have fallen from time to time, as is evident from the vacuities in the roof: the bowlders do not continue far

[58] This is from General Arbuthnot's own account, as recorded in Dickens's "Household Words" in 1853.

[59] Trans. of Geol. Soc. of Corn., III. pp. 223, 225.

above the roof, but on them lies a mass of granite stones and clay to the height of 20 feet: the lowest of these bowlders are 40 feet above high-water mark."[60] In a cavern close above the great Land's-end Hole "is a vein nearly 2 feet wide, extending in height from the top of the cavern to the summit of the cliff and filled with bowlders and pebbles to the height of about 12 feet above the roof of the cavern." In a cavern a little to the north of this "at the end and in the roof there is a vein which in front of the "cavern may be observed intersecting the perpendicular cliff, and at the height of about 40 feet from the beach a great number of granite bowlders may be seen in the midst of the vein."[61]

During a dreadful thunder-storm and hurricane "on 30 Jan., 1648, the day on which king Charles was beheaded, a large stone figure of a man called '*the armed knight*' which stood in an upright position at the extremity of the Land's-end, 40 fathoms above the level of the sea, was thrown down.[62] On the

60 Trans. of Geol. Soc. of Corn., III. pp. 227, 232.

61 Ibid, pp. 239, 240. In the preceding page Mr. Carne says that "insulated pebbles have been found in the tin lode of Ding Dong and in the copper lode of Wheal Alfred: and in the Relistian mine 100 fathoms below the surface a mass of pebbles was discovered in the tin vein about 12 feet in length, width, and thickness, and scattered pebbles were found in the vein far beyond those boundaries—the pebbles are slate, the same as the slate of the country."

62 This magnificent spire *(peal)* may have given name to *Peal* point—the most western point of England: and since its destruction, an islet three furlongs south of it has been called "the armed knight." It was probably a natural basaltic-like structure resembling others in that locality, except that in height it greatly exceeded them all: and the imagination might have pictured it as "the figure of a man," just as another rock at the Land's-end is still pointed out by the guides as a very striking likeness of Dr. Johnson's head: but if its height were forty fathoms above the sea, it must have been considerably higher than any of the cliffs in this district, for our highest cliffs rise only about two hundred feet. According to Hals' version of the

same day a ship riding in St. Ives bay, having on board the king's wardrobe and other furniture belonging to the royal family, bound for France, broke from her moorings and ran ashore on the rocks of Godrevy island, where all on board, about sixty persons, were drowned except one man and a boy."[63]

Half a mile north-east of the Land's-end is *Maen Castle* (p. 41). *Pedn-mén-du*, "the black-rock headland," which Mr. Carne estimated as about 140 feet high,[64] is immediately above Sennen cove, a romantic fishing-village in the southern part of Whitesand bay (p. 159). The dwellings of the Coast-guard in this village are on the northern side of a very steep hill, and the sun never shines on any of them during the two months nearest Christmas.

Close on the northward of Carn Aire (the northern extremity of Whitesand bay) is a short bed, about six feet thick, of rounded pebbles, on which rests a cliff about thirty feet high, composed of large angular masses of granite and clay—the sea at spring tides probably reaches this bed.

Half a mile further northward, close to the south side of the stream of Nanjulian, "is a very fine bed of bowlders and pebbles about 6 feet thick and perhaps 150 in length. The bottom of this bed is about 15 feet above the sea at high water."

Nearly half a mile further northward, at the Point south of the cove of *Pol-pry*, "clay pool," is a very thin bed of rounded pebbles, extending a considerable length, about twenty feet above high-water mark. The roofs of two small caves here are also formed of bowlders and sandy clay.

tradition, this rock was only ninety feet above high water, with an iron spire on its top (D. Gilbert's Corn., III. p. 480). But Norden describes it as "a rocke poynting into the Sea at the landes-end; wher are founde a kinde of stone that will attracte Iron" (p. 34).

63 C. S. Gilbert's Corn., II. p. 714.

64 Trans. Geo. Soc. of Corn., III. p. 227.

At Huel Oak point, not half a mile farther, a large iron vein six feet wide appears in the cliff, crosses Pornanven cove, and may be seen again at Carrick Glooze head. Immediately *on* this vein are bowlders mixed with large fragments of granite; two of the bowlders are six feet in diameter and eight feet above high water.[65]

The cliff of Pornanven cove on the north side of the stream exhibits the finest and most accessible "raised beach" in this district. "Here (says Mr. Carne) are two beds separated from each other by a mass of solid granite: the western bed is about 10 feet in height or thickness and perhaps 70 or 80 feet long: the eastern bed is at least 200 feet long: at one end it is 20 feet thick, but it gradually diminishes towards the east: the bowlders and pebbles are quite as round as any found on the sea-shore: the largest are about 3 feet in diameter, from which they gradually diminish to the size of a hazel-nut: a great number of small slate pebbles may be seen throughout this bed; but there are no large slate bowlders: the substance which fills the crevices is a mixture of calcareous sand, granite gravel, and clay, which forms a very strong and firm cement. The mass of granite stones and clay which overlies the western bed is at least 60 feet thick: that which covers the eastern bed is about 50 at one end, but at the other, not above 20. The sea, at very high spring tides, may possibly reach the foot of these beds of bowlders." [66]

The deep rugged valley of *Pornanven* or *Pornanveyn*, "port of the rocky valley," appears, as we ascend from the cove, as desolate as can be imagined until we approach Bosavern cot, when suddenly an oasis bursts into view, and we wonder how tall forest trees and beautiful sylvan scenery can exist in such a locality.

65 Trans. of Geol. Soc. of Corn., III. pp. 231, 232.

66 Ibid, p. 230.

Within a mile west of Pornanven cove are the *Brisons*, "prisons," two high rocks (also called "the Sisters") to which a shipwreck has imparted a melancholy interest. Between these rocks, on 11 Jan., 1851, the brig *New Commercial* struck during a fog and a gale of wind and soon went to pieces. All the crew perished except one who floated away on a piece of the wreck and was rescued by some boatmen from Sennen cove at the hazard of their lives. The master and his wife were washed to the little Brison and succeeded in climbing beyond the reach of the tide. On the following morning (Sunday), a calm and beautiful day, thousands of the neighbouring population had gathered on the cliffs but no boat could approach within fifty yards of the rocks. In the afternoon a communication from some boats was made by the firing of a rocket with a line attached. Mrs. Sanderson then leaped into the sea from a height of about fifteen feet but expired (after having been drawn into the boat) before she reached the shore. The husband followed and was drawn in safety through the waves after having been with his wife about thirty hours on the bare rock without any shelter or food.

After passing *Carrick Glooze*, "the grey rock," a triple headland of striking character, under which is a narrow cavern thirty feet high and fifty feet long [67] (p. 197), we descend to Priest cove or Porth Just, in the cliff of which, immediately under Little Bounds tin mine, are bowlders fifteen feet above high water, and "the adit goes through a mixture of bowlders and clay until it comes to the solid granite." [68]

We now arrive at the very prominent headland of Cape Cornwall, consisting of a steep conical hill of slaty felspar rock. Near the centre and on the northern

[67] Trans. Geo. Soc. of Corn., III. p. 223. "The sea at high water reaches the end of it."

[68] Ibid, p. 229.

side of the isthmus leading to it, are the remains of an ancient chapel, now used for a cattle-house and other purposes, the northern wall of which is about forty-five feet long and nearly five feet high, and the eastern wall about twelve feet long, each about three feet thick. The chancel (about twelve feet square including the walls) is constructed externally with large blocks of granite smoothly cut, and internally with much smaller stones: in its eastern wall is a bevelled window nearly five feet wide on the inside but much narrower outside: in its northern wall is a smaller window: both windows reach down to about three feet from the ground. In the remaining thirty-three feet of the northern wall, at the distance of twelve feet from the chancel, is a picturesque arched doorway scarcely two feet wide leading into the chapel-yard. The chancel has been walled up and roofed in as a cattle-house, and the westernmost fifteen feet of the northern wall form the lower part of one of the walls of another house, used probably as a barn. The spot containing these remains is called Parc-an-chapel. "The cross which once embellished this little chapel is of the rudest form and was rescued by him who records the fact, from the artificial water-course which passes near, in which it was immersed. It may now be seen preserved as a valuable relic in the chancel of the parish church with a brass plate denoting its ancient locality." [69] It bears the Greek monogram of Christ, like fig. 4, facing p. 63, but without the ring.

Mid-way between Cape Cornwall and Botallack mine is the fine headland of Kenidjack Castle (p. 41), from which, at the distance of five or six furlongs, we have a beautiful view of that mine and its perilously constructed machinery on the side of the cliff. "I was once underground (says Mr. Henwood) in *Wheal*

[69] Buller's St. Just, p. 45. But the cross was not there a few years since when I visited the parish church.

Cock (now part of Botallack Mine) during a storm. At the extremity of the *level* seaward, some eighty or one hundred fathoms from the shore, little could be heard of its effects, except at intervals when the reflux of some unusually large wave projected a pebble outward, bounding and rolling over the rocky bottom. But when standing beneath the base of the cliff and in that part of the mine where but nine feet of rock stood between us and the ocean, the heavy roll of the larger bowlders, the ceaseless grinding of the pebbles, the fierce thundering of the billows with the crackling and boiling as they rebounded, placed a tempest in its most appalling form too vividly before me to be ever forgotten. More than once doubting the protection of our rocky shield we retreated in affright, and it was only after repeated trials that we had confidence to pursue our investigations." [70] In this mine the ore has been excavated upwards so near to the bottom of the sea that the water has entered: a small plug however, says the same author, sufficed to protect "the workmen from the consequences of their rashness." Mr. Carne observes, "that the noise of the waves is much more distinctly heard by the miners where the rock is very compact, such as the hornblende-rock of the St. Just mines, than where it is not so hard, but tough and slaty, such as the clay slate of Huel Providence between St. Ives and Hayle, and Huel Rose near Porthleven." [71]

In the valley terminating in the cove between Cape Cornwall and Castle Kenidjack is Wheal Cole mine with a very large water-wheel and a variety of machinery worked by steam. This valley contains a surprising number of water-wheels worked successively by the same stream for various mining purposes.

After passing through Botallack and Levant mines we arrive at the romantic fishing-cove of Pendeen, where the three miles of slate formation, beginning with

[70] Trans. Geo. Soc. of Corn., v. p. 11. [71] Ibid, II. p. 344.

Cape Cornwall, terminate. "A stratum of pebbles about three feet thick (says Mr. Carne[72]) commences just at the junction of the granite and slate and continues on the granite side almost to the northern termination of the cove: near the slate country they are almost all slate, but at a little distance, granite pebbles are mixed with them: the crevices are filled with sand, and in one part of the cove a bed of sand rests on the pebbles. The mass of granite stones and clay which rests upon the bed is 60 feet in height: the sea at spring tides reaches the pebbles." Mr. Carne then gives the following result of his observations on such strata of rounded stones in our cliffs:—"The beds or strata of bowlders always rest on the solid granite: even where they form the roof of a cavern each side of the arch rests on the granite: above and resting on them are masses of angular granite stones with gravel and clay;—the angular stones and the bowlders are sometimes partially intermixed; but I have never seen a bed of angular stones below a bed of bowlders: the particles of granite and quartz, mixed with the clay in the crevices between the bowlders, are not rounded but angular: they are, in fact, disintegrated granite, or growan, similar to what may be found on the tops and sides of the granite-hills: at Pendeen cove the pulverized matter in the crevices is almost wholly sea-sand; at Pornanven cove it is partly sand; in a few other instances there is a small quantity of sand; but in general there is none at all."

Close above this cove is Pendeen House, in which the Rev. Wm. Borlase, LL.D, the Author of the Natural History and Antiquities of Cornwall and Observations on the Scilly Islands, was born. Several of his Papers are printed in the Transactions of the Royal Society He was fifty-two years rector of the parish of Ludgvan forty of which he was also the vicar of his native parish.

72 Trans. Geo. Soc. of Corn., III. p. 236.

of St. Just. He died in 1772 in his seventy-seventh year at Ludgvan, in which church are monuments to him and his wife with Latin inscriptions, copied in Polwhele's Corn., v. p. 118. Close to Pendeen House is Pendeen cave (p. 46). Half a mile south-west of it is Boscaswell, where Roman coins have been found (p. 55). "In a small garden in this village will be found the entrance to one of those subterranean caverns which are not uncommon in this neighbourhood."[73] Another half-mile south-west brings us to Trewellard where "there is in the croft called the Reins, a pair of circles"[74] like those of Higher Bodinnar Crellâs (p. 46) "built of large stones set on edge within and without and the interstice is filled with earth about 4 feet high, opening one into the other. The diameter of the eastern circle within is about 24 feet. The western one is elliptical, measuring about 30 feet by 20."

The new District church of St. John the Baptist, in Pendeen, was opened about ten years since. The Rev. Robert Aitken its incumbent (says the Rev. F. Hingeston), "was the architect and master builder and the parishioners their own masons and carpenters. This really fine cross church (for it is 135 feet long, very lofty, and modelled after the ancient cathedral of Iona) cost little more than the value of the materials. It was built entirely by the people of the village and chiefly in their extra hours. Circumstances such as these invest Pendeen church with an interest which attaches to no other modern church with which I am acquainted and seem more like a legend of the earlier ages of Christianity than a plain uncoloured fact of the 19th century."

Before we leave St. Just I must mention that "of all the spots in Cornwall most interesting to the mineralogist and the geologist, there is probably not one which, in so small a compass, has produced so many species

[73] Buller's St. Just (1842), p. 81. [74] Ibid, p. 82.

and varieties of metallic and earthy minerals, or which presents to view so many geological peculiarities as have been discovered in the parish of St. Just. This parish has been remarkable from time immemorial for its treasures of tin: but it is only of late years that it has been discovered to be as rich to the mineralogist, as to the miner and the merchant." "Indeed so different is it from every other part of Cornwall that occurrences which would be deemed singular and extraordinary elsewhere excite little astonishment here. The associations and combinations of its different minerals are such as are met with nowhere else." [74]

Half-way between Pendeen cove and Gurnard's head is Bosigran cliff-castle, on the top of which is a logan-rock 10½ feet long, 7½ broad, and 28 in circumference, resting on another large rock. It logs with ease. (p. 41.)

The finest headland on our northern coast is the cliff-castle of Gurnard's head (p. 42)—so called from its resemblance to the well known fish of that name. Close by the path along the edge of the cliff leading to the isthmus from the east, and near an ancient "Holy well," are some remains of a chapel including a granite-altar. In the cove adjoining its eastern side pilchards are often caught in seines.

This promontory (says Sir John Forbes) exhibits "an excellent illustration of stratification in general, and the clearest example of the general characters of that particular assemblage of rocks which immediately repose on the granite in this part of Cornwall and to which I have given the name of the slate formation. The Gurnard's head is perhaps one hundred yards wide and five or six times that space in length. It runs out into the sea in a direction nearly north, and its sides, particularly the western, are nearly perpendicular: it therefore exhibits a grand natural section of the strata that compose it: these are the following,—first, horn-

[74] Mr. Carne, Trans. Geo. Soc. of Corn., II. p. 290, & VI. p. 47.

blende-rock, forming the grassy brow of the shore; next, slaty felspar of the thickness of one hundred yards; then regularly alternating beds of this rock and hornblende-rock or greenstone to the number of twenty or thirty, of all magnitudes from a few inches to twenty feet in thickness;—the thickness of the slaty beds, however, exclusive of the one first mentioned, is not nearly so great as that of the beds of hornblende-rock or greenstone."

"At the most western point of Polmear cliff (a mile from Gurnard's head), where the two formations come in contact, the granite is traversed by a great many shorl-rock veins. At one particular spot, these, running vertically, divide the granite into vertical masses similar to those observed on the south side of St. Michael's Mount. The display of granite veins traversing the slaty rock is here particularly splendid. In several places, large insulated masses of the granite many yards in diameter are seen lying in, or protruding through the slaty rock and giving off veins,—some of considerable width,—in all directions: several of these are seen rising vertically to the summits of the precipitous cliffs, and some can be traced to the edge of the sea at low water."

"On the coast immediately westward of Zennor church the cliff runs, for perhaps half a mile, on the very line of junction; and lays open an endless variety of appearances, which, from their rarity in other countries," would render this cliff more famous in polemical geology than St. Michael's-Mount, were it visited by tourists so frequently as the latter. At Wicca cove, a mile north-east of Zennor church, are additional illustrations of the striking phenomena attending the junction of granite and slate.[75]

"A walk of a few minutes from the church in the direction of the sea brings the visitor to the Giant's

[75] Trans. Geo. Soc. of Corn., II. pp. 260–262.

Rock, a large block of granite 19 feet long and 3 in thickness, with rock basins on the top. It logs admirably if any one stands upon it on the corner nearest the church."[76] Half a mile due east from the church is Zennor cromlech, the finest of all in this district (p. 28). In the road from thence to St. Ives are the St. Ives Consolidated Mines, wherein, in connexion with a lode, is a *Carbona* or deposit of tin-ore, worked in one place, says Mr. Henwood, "at least 10 fathoms in length, breadth, and height:" "the scattered lights, the great number of miners in their soiled and torn working-dress, the pillars and beams of wood which support the roof and *walls*, and the rock lining this vast cavern, all dimly discerned, at intervals, by flickering and uncertain gleams, produce a most striking effect."[77]

St. Ives is the only parliamentary borough in this district. Within its beautiful bay the creek of Hayle runs so far inland that, before the Hayle causeway was built, the marks left by the highest tides in this bay and in Mount's-bay were only three miles apart, and the intermediate land is so low that a ship-canal could be easily made to unite the two bays. When the St. Ives' breakwater, recommended by the committee of the House of Commons in 1859, and the Mount's-bay breakwater (p. 171) are finished, the Land's-end peninsula, with its northern and southern breakwaters, must sooner or later, if England retain her supremacy in commerce, become the most important commercial district in the whole world. Owing to the present insecure harbour of St. Ives, and to its distance from the great road from Truro to Penzance, the borough, although a healthy watering-place for those who require a bracing air, is still distinguished chiefly for its fisheries. The calcareous sand which borders the bay and rises around

[76] Rambles in Western Cornwall, by Mr. Halliwell, p. 135.

[77] Trans. Geo. Soc. of Corn., v. p. 22.

it into considerable hillocks, now almost everywhere covered with turf or the *Arundo arenaria*, is used abundantly in the neighbouring parishes for manure, and is also carried by the railroad to great distances for the same purpose. Some years since buildings were erected for making lime of the sand; but the undertaking not succeeding, they were converted into the present arsenic manufactory—the tall chimney of which is a conspicuous object from the railway.

In the eastern part of Hayle creek are tide-gates and a canal made by the Cornish Copper Company to bring vessels to their works when they smelted copper-ore.[78] They soon afterwards converted these works into their present Iron Foundery. The scoria, as it came from the furnaces, was cast into large quadrangular blocks for buildings, and many houses in that neighbourhood are built of them. The fences too of some of the fields are made of these "vitreous cubes so piled upon one another as to leave interstices" like net-work, and it has therefore been facetiously observed that "in Cornwall the fences are made of glass and you can see through them." In the central part of the creek are other tide-gates formed by Messrs. Harvey & Co., at whose Iron Foundery, as well as at the former, the largest steam-engines for the Cornish mines are made. By these gates the extensive piers are kept free from the sand that would have accumulated at the mouth of the river. Formerly the trading-vessels frequented the Lelant (or western) side of the creek—for Norden (writing probably in 1584) says that Lelant was "sometyme a hauen towne and of late decayde by reason of the sande which hath choaked the harbor, and buried muche of the lande and howses; and manie deuises they vse to preuent the obsorpation of the churche" (p. 42). In this church are, a Norman arch (the only one in this district), a doorway and steps in

[78] Drew's Cornwall, II. p. 553.

the northern wall which led up to a rood-loft, a piscina in the south-east corner of the chancel, a tablet containing the letter of king Charles to his faithful Cornish, and a stoop for holy water in the inner corner of the porch. It is the mother church of St. Ives and Towednack churches. On the hill-top looking down on St. Ives is a large pyramid of granite erected in 1782 by Mr. Knill, a native of Cornwall, for his mausoleum, but having died in London in 1811, he was buried, as directed by his will, in St. Andrew's church, Holborn. Long before his death he settled £10 a year on the corporation of St. Ives to be periodically distributed, partly for useful, and partly for other, purposes:—amongst the latter is the quinquennial dance by ten girls not exceeding ten years of age on the ground adjoining the pyramid on St. James' day.[79] In Phillack churchyard is an inscribed stone not yet deciphered, which, the Rev. F. Hockin, the rector, informs me, "was one of the foundation stones of the late church near the south-eastern corner of the chancel." There also may be seen a fine old cross and the monogram of our Saviour (p. 63). Near the Hayle Railway station is another inscribed stone (p. 60). Trecrobn hill-castle is a mile north-west by west of the St. Ives Road station, and could be visited on our way back to Penzance.

In our tour round the coast the only antiquities we saw besides the cliff-castles are those mentioned on pp. 183–5, 199, 202: the rest being numerous and scattered, some days will be required to visit them.

Let us first take a drive on the Land's-end road. After passing the pretty valley of Buryas and the avenue leading to *Nancothan*[80] mills we have, from the

79 D. Gilbert's Corn., II. p. 266 ; & Guide to Penzance, p. 168.

80 The article *an* "the" is for euphony placed at the end of this word—*Nan coth an* "the old valley."

Nancothan avenue of elms was planted by my father about sixty years since when acting as solicitor to the proprietor. That part of

turn of the road near the top of the hill, a very beautiful view of the Mount. On arriving at the "four lanes end" in Lower Drift, we walk three hundred and twenty paces on the northern road, enter a gate-way there on our right, pass across the field and down to nearly the bottom of a very steep croft, to examine a remarkable granite-pillar, bearing crosses made perhaps ages after its erection. A furlong further, on the Land's-end road, on the top of the hill and opposite the lane to Higher Drift, we see, close on our left, two large *myin heerion* (p. 65), and a few fields off, towards the south, another *mên heer* (p. 32). A mile more, on the Land's-end road, brings us to the broadest and finest *mên heer* in the district, in the estate of Trenuggo (p. 17). After another mile we reach a solitary cottage on our right, from whence we walk a quarter of a mile towards the south, across crofts, to Boscawen-ûn circle (p. 16), the most famous of all our "Druidical Temples," and probably one of the three *gorsedds*, or places of judgment of Britain mentioned in an ancient Welch triad—"The three Gorsedds of Poetry of the island of Britain; the Gorsedd of Boscawen in Damnonium; the Gorsedd of Salisbury in England; and the Gorsedd of Bryn Gwyddon in Wales." This translation is by an eminent Welch scholar and antiquary, the late Rev. Thomas Price. "I do not hesitate" he says "to translate Beiscawen (as it is in the original) Boscawen in Cornwall, between Penzance and the Land's-end, near which are some Druidical remains, especially a stone circle."[81] The pillar in the centre of this temple and the supposed cromlech in its circumference[82] were probably sepulchral monuments subsequently erected,— for even

the valley immediately above Nancothan mills which forty years ago was a rocky barren wilderness, with some of its sides quite precipitous, is now converted into gardens and orchards.

81 "A Week at the Land's-end," by Mr. J. T. Blight, p. 73.

82 Borlase's Antiquities, pp. 186, 215.

Christian churches are to this day occasionally used as habitations for the dead. There is a barrow near it. About mid-way, and close on our left, in returning to our carriage is Creeg Tol, a remarkable carn with several rock basins, one of which will be easily recognised as "the giant's foot-print." The mênheer nearest the temple is that first mentioned on p. 17. A mile further on, at *Crouz-an-wra*, and at the ancient cross still standing on the south side of the road (from which cross the village no doubt derived its name), we leave the Land's-end road, take that leading to St. Just, alight at the highest part of it, and send our carriage round three miles to wait for us half a mile west of Sancreed church. We then ascend Chapel Carn Brè on our left, the summit of which high hill in Borlase's time was crowned with "an artificial hill" of a conical form 20 feet high," walled round with large stones: on this stood the chapel of which scarce any traces now remain. It "was a free privileged manumized chapel (says Hals) where the Bishop could not visit."[83] Chapel Euny is a mile north-east of these ruins by the way of Tredinney: the *longitudinal cave* leading into the *beehive cave* at Chapel Euny (p.52) will probably (judging from the very little of it now visible) prove to be as regularly built with overlapping stones as are the remains of that at Old Chyoyster (p. 51.)

Close on the north-north-west of Chapel Euny well is Bartinè hill; and within the circular vallum on its summit (p.38) are three small circles edged with "stones on end, and contiguous to each other—one is nine yards in diameter, the other seven."[84] Close on the east-north-east of Chapel Euny is Caër Bran (p. 38), from which we may descend to our carriage, and on our way to Penzance examine in Sancreed churchyard one of the finest old crosses in the district. Sancreed is the only parish near Penzance not washed by the sea.

[83] Buller's St. Just, p. 50. [84] Ibid, p. 88.

In driving from Penzance towards St. Just we see, close on our right, the "Round" on Castle Horneck estate (p. 39), and on our left the two sepulchral stones on Truen estate (p. 65). Above Truen village, on our right, is the "Round" mentioned on p. 39. At Higher Bodennar, on the right, in the croft close above the farm-house, is the site of a British village (p. 45), and a furlong or two north of it the *Crellâs* (p. 46). The barrows on "Old Castle," a hill-top on our left, are scarcely worth visiting; but those a little beyond, on the top of Trannack downs, on the same side of the road, are more deserving of a visit than any others in this district (p. 33). After seeing the church of St. Just[85] with the ancient inscribed stone in its chancel (p. 62), and the *Plan-an-guarè*, "plain of sport," in the middle of the town (p. 63), we go northward to the southern foot of the hill crowned with the very remarkable Carn Kenidjack, where are the remains of two "Druidical temples" (p. 17): in walking from them to the ancient deep well and the two remarkable circular enclosures which Mr. Buller calls the "Carn Yorth Circles" (p. 53), we pass some "Giants' Graves" (p. 23) and four "holed stones" (p. 18). Half a mile east of Carn Kenidjack is the *mênheer* in the "Long stone" croft, adjoining the north side of the great road from Pendeen to Penzance, of which (under the name of Boswens Stone) Borlase has given a figure at p. 157 of his Antiquities. Half a mile north by east of this stone is Chûn cromlech (p. 261), and close by are Chûn castle (p. 35) and the British village of Old Bossullow (p. 44).

[85] This church was probably dedicated to St. Justus, who was sent to England with St. Augustine and other monks, A.D. 596, to convert the Saxons, but from what has been stated on pp. 62, 59, and from the fact of the church-town tenement being formerly called Lafrouda (*Laf* or *Lan*, "church," and *roud* or *rood*, "a cross or image of the crucifixion"), there is reason for supposing that a church existed in St. Just before the time of Justus, and that its most ancient name was Lafrouda. (Buller's St. Just, p. 19.)

Returning to our carriage on the hill-top south-east of Long-stone croft, we drive back to Penzance. From this hill-top one beautiful evening I beheld St. Michael's Mount in the midst of the silvery waters with the moon rising behind it in all her splendour, whilst the Lizard lights, the Longships light, the St. Agnes revolving light, and the floating light of the Seven-stones could be all distinctly seen from the same spot. It was a soothing and hallowing sight to behold these silent watch-fires, kindled during many a revolving year with uninterrupted regularity at every approach of night, and kept brightly burning until morning, to guide the lonely mariner as he ploughs his way along our rocky coasts.

We go next to Madron church, once belonging to the Knights of St. John, whose college at Landithy (lately displaced by a farm-house) almost adjoined it. In the churchyard on the tomb of Alexander Daniel are the following lines:—

> "Belgia me birth, Britain me breeding gave,
> Cornwall a wife, ten children, and a grave."

His son, George Daniel (buried there in 1716), was the founder of the Madron Charity School, the lands of which now yield about £105 per annum, besides the school and master's house and gardens adjoining the churchyard. The way from the church to the celebrated Madron well chapel is by the Morvah road, and by the right-hand path through the field next the Union Poor-house: this path leads to Boswharton lane, on reaching which we turn into an adjoining wheel-track on our right, south of some old fir-trees, and proceed a furlong or two down the valley and over hedges to the chapel. The walls, twenty-five feet by sixteen, are in excellent preservation, and face the magnetic N., S., E., and W. The only entrance is through the northern wall, the door-way being two feet wide without, and two feet eight inches within.

In its south-west corner is a sort of well, or font, with an inlet and outlet for the water—running water for baptism having been anciently preferred to standing water. Remains of low stone seats are still against the walls: and a step, or row of stones, separates the nave from the chancel. The altar-slab, five feet ten inches by two feet seven, rests two feet ten inches above the level of the floor: in its centre is a very shallow socket nine inches by eight.[86] The building was enclosed by other walls, remains of which are still to be seen. Having returned to the fir-trees and entered Boswharton lane we proceed northward, leaving an ancient Greek cross on our right, and ascend by a path through the fields on our left, up to the highest part of the Morvah road, three-quarters of a mile beyond which is Lanyon Quoit[87] (p. 25). We must climb fences and cross pathless fields to reach West Lanyon Quoit (p. 25). Two furlongs beyond Lanyon village we turn into a very rough road on our right over Bossullow downs, and about two hundred yards beyond the second solitary cottage by the road-side we climb over a low fence on our right, and after walking about a hundred and twenty yards in the direction of Ding Dong mine we reach the Mên-an-tol (p. 19). Retracing our steps to the road and walking about three hundred and fifty yards farther from the cottage we turn into a croft on our left, in the middle of which, and about sixty yards from the road, is the fallen mên-scriffys (p. 64). The two-headed Carn Galva, the mên-scriffys, the mên-an-tol, and West Lanyon

86 These measurements are from Mr. J. T. Blight's "Ancient Crosses, &c." p. 59.

87 Borlase says this Quoit was high enough for a man to sit on horseback under it. Some have thought therefore that the supporters were shortened when it was replaced in 1824; but Borlase described it after it had been dug under, and the excavation, since filled in, may have made the depth beneath the cap-stone nearly twice what it now is.

Quoit are nearly in the same straight line. About a quarter of a mile east by south of the mên-scriffys is the "Druidical Temple" of Boskednan (p. 18); a mile east-north-east of which is Mulfra Quoit with some barrows near it (p. 26): and a mile and quarter north-west of Mulfra Quoit is Bosprennis Quoit (p. 27); whence we proceed to Gundry cave (p. 27): half-way between which and Castle-an-dinas (p. 37) are the remains of a very large cairn [88] or barrow in Lady Downs (p. 34). Within a mile west by south from Castle-an-dinas is the British village of Old Chyoyster [89] (p. 49). The cave in this village, built of stones regularly overlapping one another, resembles the *weems* or ancient subterranean dwellings of Scotland. The caves of Boleit and Pendeen (p. 46) are not so regularly constructed as this. The walls of Boleit cave are perpendicular, with the exception of a few stones occasionally projecting near the roof to support the covering-slabs when too short to span the walls: and the Pendeen cave is very irregularly built, although most of the stones overlap. The inscribed stone at *Bleu* ("parish") bridge (p. 65) and castle Lescudjack (p. 39) are close by the way back to Penzance.

We must take one drive more, to see the inscribed stones in St. Hilary churchyard (pp. 57, 63), the Roman camp at Bosense (p. 56), and the British Castle Cayle (p. 39), in Phillack, close by the eastern side of the road from Hayle Copper-House to Fraddam, and about half a mile north-west of Fraddam. Although Lysons, writing about fifty years since, says "Castle Cayle, spoken of by Leland, with a moat and a keep belongs to the heirs

88 *Cairn* signifies an *artificial* heap of stones. In Cornwall such heaps, whether over the dead or around our mine-shafts, are called *burrows*, of which the English word *barrows* may be a corruption. *Carn* here signifies a *natural* pile of rocks.

89 In the Ordnance Map the name is spelt Chysoyster—but I have omitted the first *s* as that letter is not in the older map by Martyn.

of John Curnow, Esquire,"[90] yet D. Gilbert doubts "whether any castellated house was ever built there, or even a military work:"[91] but this military work when I visited it about twenty years ago was precisely as I have described it on p. 39. In 1861, on my second visit, I found that the ditch between the two earthworks had been filled up, as well as the ditch nearest the road, and much of the earthworks levelled for making a garden adjoining a cottage lately erected by the road-side. The builder of this cottage informed me that in levelling the latter ditch he found on the north side, a miniature cromlech consisting of four upright stones supporting a top-stone, enclosing a space about a foot square and half a foot deep, excavated in the *fast* about a foot beneath the soil, and containing ashes —the stones having evidently been subjected to a strong fire.

There are many remarkable single pillars in this district besides those which I have noticed—and there were many more a century or two since which have been destroyed without any descriptions of them being preserved.[92] Most of them were doubtless ancient monumental pillars. The only one in the Ordnance Map which I have not mentioned was that, twelve feet high, standing about 1839 in the estate of Selena, near Sparnon, half-way between St. Buryan church and the Logan-rock on the western side of the road, in a field still called the "Long-stone" field—but it was soon afterwards destroyed by the occupier of the land, as recorded in the Gentleman's Magazine for May, 1844, p. 485, by a writer from Penzance under the signature

[90] Lysons' Cornwall, p. 266.

[91] D. Gilbert's Cornwall, III. p. 342.

[92] Borlase, in his Antiquities, p. 162 (2nd edit.) says, that "in Cornwall there is a great number of high stones still standing in many places. Many have been carried off for building and many still remain where they fell from their erect position."

"P," in a powerful appeal for the preservation of our antiquities, many recent instances of destruction being mentioned by him. "Crosses innumerable (he adds) have been destroyed and their sites are now only known from local names indicating their former existence, or from portions of them built into the adjoining hedges."

Whilst writing the last ten pages Mr. Halliwell kindly presented me with a copy of his "Rambles in Western Cornwall" just published (Nov. 1861), wherein he describes three ancient monumental stones not before noticed by any author. Two of these are near the north side of the road from Penzance to the Logan-rock and within a mile east of St. Buryan church: that on the estate of Trelew is very conspicuous from the road at the distance of about a furlong, and is "slightly inclined from the perpendicular, nearly ten feet high, very irregularly shaped, eleven feet in circumference at the base where it is nearly rectangular, but thinner and wider towards the top:" "three-quarters of a mile further on towards the church, near the farm-house of Pridden, is another, eleven feet high, from five to six wide, and varying from sixteen inches to two feet in thickness: this is now in an earthen hedge of three feet in height, so that its magnitude is somewhat concealed." p. 206. The third mênheer is in a field adjoining the farm-house of Chy-an-hâl: "this is a block of unhewn granite, irregularly shaped, nine feet in height, eight in circumference near the base, but tapering towards the top in a wedge-like form." p. 185. Chy-an-hâl is not half a mile from the Kerris Roundago (p. 16) and the lane ascending thither southward from Burias Bridge (p. 207) presents some of the finest views in Mount's-bay.

Mr. Halliwell not without reason warns "the unsuspecting tourist who so often likes to make a short cut over a moor, of the danger of tumbling into one of the old mining shafts, the mouths of several of

which are overgrown with furze, concealed but not protected." p. 16.

In these excursions strangers will remark the almost universal practice in harvest-time of making the sheaves into "round" or "*arish*" mows some weeks before their removal from the fields, in order that they may be thoroughly dried—each mow generally consisting of from two hundred to two hundred and fifty sheaves built up into a solid cone ten or twelve feet high, the inverted sheaf forming the apex being the only one with its ears exposed to the rain. When the season is less dry than usual the mows are made smaller to allow the corn to dry faster.

Another peculiarity here is the large heaps of earth planted with cabbages in the middle of the fields. These heaps, ploughed up from the ditches, produce the richest part of the crops, and the earth, thus prepared, is afterwards, when mixed with ashes and other substances, better adapted for being spread over the land as manure.

Again, the walls or fences or (as they are here called) the *hedges* of the fields consist sometimes of granite pillars and slabs five or six feet high, set upright in contact with each other, with scarcely any interstices—at other times of huge blocks of various shapes placed with their broadest sides on the ground as close to one another as possible, having the vacuities above their bases filled up with smaller stones. In some places they are built, in the Cyclopean style, with a mixture of granite blocks of all shapes and sizes from one to six or eight feet in length or diameter, the walls being often of astonishing thickness. Strangers might suppose much unnecessary labour was spent in these structures: but they are the least expensive of all fences—resulting simply from clearing the fields of the rocks which now enclose them.

When fatigued by walking and climbing we may

obtain a refreshing cup of tea with nice bread and rich Cornish cream in almost any village or hamlet that happens to be near us—and the cottagers who cheerfully supply us make no charge, but are content with what we give them. The Cornish cream, which is very delicious, differs from that of other counties in being clotted and thicker, and is made by placing the milk over a fire. *Unscalded* milk makes more butter than *scalded;* but as the former must remain several days before it is skimmed, the milk when the cream is removed is sour and fit only for pigs; whilst scalded milk after being skimmed is a very common beverage of the labouring farmers. The clotted or scalded cream is more easily made into butter than the unscalded.

CHAPTER XVI.

THE PILCHARD FISHERY.—LUMINOSITY OF THE SEA.—MARINE AND LAND ANIMALS AND FLORA.

HAVING considered the Antiquities and several branches of the Natural Phenomena of this district, I will in the present chapter notice some of its marine and land animals and flora—beginning with the pilchard.

The Pilchard *(Clupea pilchardus)*, for whose reception in its annual visits to the western coasts of Europe far greater preparations are made in this district than anywhere else in Cornwall or Britain, is smaller and rounder than the herring *(Clupea harengus)*. The meshes in a *driving* net for pilchards are between twelve and thirteen in a foot; for herrings, about eleven; and for mackerel, about eight.

We learn from Mr. Couch that the pilchard congregates in deep water, within limits extending from the west of the Scilly Isles as far sometimes as the Irish, Welsh, and Cornish coasts—from whence it makes two migrations every year to the land, the first being southward, and beginning in July or August. "A portion strikes the land north of Cape Cornwall and turns in a north-easterly direction towards St. Ives, constituting its summer fishery. The great bulk passes between the Scilly Islands and the main land. To look from Cape Cornwall or from any of the high lands of St. Just and see this immense moving mass, extending as far as the eye can reach, approaching the shores and reddening the waters, is a sight of great interest and beauty, and such as would repay any exertion to witness." "The cause that can limit their wanderings from the *Smalls* on the Welsh coast and from a line

(lat. about 52° N.) between that islet and Waterford on the Irish coast," "to the Cornish shores, to the Start point and Bigbury bay in Devonshire on the east, cannot be surmised."[1]

The second migration commences in October or November, and the shoal appears first on the north-eastern shores of Cornwall, being "very rarely seen to the east or north-east of Lundy island. After having touched the shore, they always pass down close by the coast,[2] and in such vast swarms as even to obstruct the passage of vessels. At the usual time in 1834 this immense shoal passed into St. Ives bay; and a portion remained in the waters on its western side, occupying the whole of the distance from the mouth of Hayle river to the town of St. Ives—more than two miles in a direct line—and the transverse diameter of the shoal was about three-fourths of a mile." Amidst this mass of fish a seine was *shot*, and Mr. Carne in a letter to Mr. Couch stated that "one hundred and twenty boat-loads, or 3,600 hogsheads, were landed and carried to the cellars—each hogshead containing fifty wine gallons or about 3,000 pilchards (as the fish were not large), making altogether (including 400 hogsheads that were lost after their enclosure) the enormous quantity of 12,000,000 fish."[3] These 12,000,000 of

1 Trans. of Penzance Nat. Hist. & Antiq. Soc. for 1847, p. 129. *Herrings* however appear to "seek such parts of the North Sea as are not colder than 54° nor warmer than 58°, tending to establish the fact that it is all but useless to cast nets for herrings in places where the surface-water is not between these limits of temperature." (Comp. to Brit. Almanac for 1861, p. 34.)

2 The large fish which prey upon them always keep on the outside of the shoals.

3 A much larger capture by a single seine was made at St. Ives in the latter part of October, 1851, when there were landed from a seine belonging to Messrs. Bolitho not less than 5,600 hogsheads. In 1853 a seine was shot at St. Ives from which 5,500 hogsheads were landed. On the 9th, 22nd, and 23rd of October, 1858, seines

pilchards (Mr. Couch adds) were enclosed in a circle not 54 fathoms in diameter and only 7 fathoms deep. "As they pass in such immense shoals, filling our bays, large quantities are frequently pushed on shore by the moving hosts behind. * * * In October, 1846, a shoal passed into St. Ives, and 30,000 hogsheads (75,000,000) of pilchards were enclosed in a few hours," the greatest quantity ever enclosed in one place at one time: of these about 23,000 hogsheads were landed. The "winter" shoals generally arrive at St. Ives in the latter part of October. "In 1844 they passed the whole length of the northern shores of Cornwall to St. Ives in about four days. From this circumstance they were expected round the Land's-end daily; but they took three days to make the circuit of St. Ives bay: on passing Clodgy point, its western boundary, they resumed their former rapid progress, and in two days made their appearance in Mount's-Bay and passed up the British Channel. * * * When preparing for migrations fish of the same size and fatness always herd together; so that different seines will take very variable fish: but when the whole are united and the migratory feeling is at its greatest development, then the largest and healthiest fish take the lead and the weaker and smaller fall into the rear; hence the fish first taken are generally the best. When the pilchard has assembled it drives nearly all other kinds away, except those which make the pilchard their prey; but in the largest 'schulls' even these disappear. * * At St. Ives, it is a general remark that the herrings are always inside the shoal of pilchards, and when these are taken near the shore, the bulk of the pilchards may be expected; the explanation being, that the herrings are driven before the advancing hosts. If mixed fish are taken in the drift nets no shoals are

were shot at St. Ives from which 11,800 hogsheads of pilchards were taken to the cellars.

expected, in consequence of the assembling not being completed."[4]

Mr. T. S. Bolitho has likewise given us some interesting particulars respecting our always welcome though somewhat "capricious visitor. The old notion that pilchards come from the Northern Ocean is now exploded. The large shoals which visit our shores come from the south-west: this was clearly shewn in 1836, and since that period it has been fully confirmed. On several occasions, during the months of July, August, and September, masters of vessels have fallen in with pilchards south-west of Scilly. A few scattered pilchards remain in our southern channel during the entire year, but it is not until about Midsummer that the first shoals (which are usually small) make their appearance; and as nearly as possible at the same time the pilchards arrive on the west and north-west coast of France, and on the northern coast of Spain: the French and Spanish pilchards are not much more than one-third as large as our fish. Why the larger fish should keep on our own coasts is, I believe, unaccounted for; the temperature of the water must be nearly the same. * * * While the pilchards were so plentiful in Mount's-Bay during the early days of August, 1850, the fishermen observed unusually large quantities of sea-lice *(Entomostraca)* in the water. This seems to bear out Mr. Couch's statement that the pilchard visits our shores in search of food.[5] * * * *

[4] Transactions of the Penzance Nat. Hist. and Antiq. Society for 1847, p. 136.

[5] This food forty years ago was forty times more abundant than it is at present; for then the sea-weed washed on shore by storms was never removed, but lay in a state of decomposition near high-water mark swarming with animal life, which attracted not only pilchards, but shoals of various other fishes to our shores. Now, however, not only is nearly all the sea-weed carried away for manure as soon as it is deposited, but men go out in boats at low tides to cut it whilst growing on the rocks. Thus, whilst the French supply their fishing

I have seen roes in pilchards during more than half the year, and an old fisherman lately assured me that he had met with roes in pilchards during every month of the year. * * * On the north-west coast of France the pilchard fishery is of greater importance than with us; the fishery, which is wholly carried on by drift-boats, extends from Brest to about Belle Isle: between the small ports of Douarnenez and St. Louis there are more than 1,000 boats employed on it. The French fishermen throw out their nets during the day time towards evening: probably the water is not so clear as it is in our channels: they use the roes of cod-fish imported from Norway to attract the fish. The season of 1849 was unusually productive: not less than 120,000 casks were *cured*, weighing 180 lbs. each—about one-third of our hogshead: but on an average the quantity cured is about 80,000 to 90,000 casks, or nearly half as much again as the quantity cured in Cornwall. In 1849 about 10,000 to 20,000 casks were sent to Italy, but this is the first instance I have known of French pilchards coming into competition with those exported from Cornwall. In most cases the whole of the fish caught are consumed in France. The mode of *curing* is very similar to that practised here. The fishery commences on the French coast towards the end of June, and continues, with slight interruption, till the middle of November."[6]

The seine *(sayn)* or net used in St. Ives bay for capturing pilchards is between one hundred and fifty and two hundred fathoms long, and from seven to ten fathoms deep. More than two hundred and fifty of

ground with bait (as we shall presently see), the Cornish actually deprive their fish of the very food which nature had provided for them—and this I imagine is the chief cause of our coasts not being now visited so constantly with shoals of fish as they used to be when the sea-weed remained in our bays and coves.

[6] Trans. of Penzance Nat. Hist. & Antiq. Soc. for 1850, p. 441.

such nets are kept at St. Ives, each having its own *seine-boat* to carry it. But the fishing-ground not being extensive very few of these boats can be on it at one time, and each must therefore wait for its turn—so not less, probably, than seven-eighths of all these seines and seine-boats are unemployed, whilst the rest are taking their turns. Such an extraordinary sacrifice of capital, merely for obtaining turns (the number of turns to each fishing-company being proportionate to its number of seines and seine-boats), shews the great value of the fishing-ground. Every seine-boat when its turn arrives is attended by one or two *tow-boats* with *stop-nets*, and also by a smaller boat called the *follower*, used principally for carrying the men to and from the larger boats. When the *huers* stationed on the hills perceive a shoal *(school)* of pilchards they immediately hail their respective boats, and by signs give the necessary directions for their capture. The most common indication of a shoal of pilchards is a reddish hue, like that of sea-weed (very different from their colour out of water), and the denser the shoal the deeper is this hue.

As soon as the *seine-boat* and *tow-boat* are within reach of the shoal they start from the same point in opposite directions and are rowed rapidly round the fish, while the nets which they carry are being *shot* or cast into the sea. When the *seine* and the *stop-net* meet they are immediately joined and form a complete circular wall round the pilchards, about three hundred fathoms in circumference and reaching from the surface to the bottom, the nets being kept in a vertical position by corks strung on their *head-ropes* and leads on their *foot-ropes*. This net-work enclosure with all its contents is then warped towards the shore into the securest part of the bay, out of the reach of the strong tidal current, and there moored with anchors so placed as to keep it as open or as nearly circular as possible. Within

this large net a small one called the *tuck-net* is introduced at low-water, whereby the fish are raised to the surface, dipped up in baskets into boats, taken to shore, and carried in hand-barrows *(gurries)* to the cellars to be *cured* or salted.

The best kind of cellar for this purpose is a pent-house or lean-to, opening everywhere into a central court. The pilchards, as fast as they are poured from the hand-barrows into the court, are taken in small baskets by children into the surrounding lean-to, where women are employed in *bulking* or placing them in layers alternating with layers of salt. A single *bulk* is about a yard in breadth, while its length and height depend on the conveniences afforded by the cellar and the quantity of fish: their height, however, seldom exceeds six feet: and the heads of the pilchards exclusively form the outsides of each bulk.

After remaining in bulk about five weeks, during which oil and other matter drain from them, they are put into troughs of water, washed quite clean, and then carefully laid in casks *(hogsheads)* holding about fifty-two gallons each, where they are subjected to heavy pressure for about a week. The oil thus expressed flows out from holes in the bottom, or crevices in the sides, of the untightened casks, and as this reduces their contents, more fish are added until each cask, when the pressure is removed, weighs at least 4 cwt. The oil obtained from the pilchards by this means and whilst in bulk varies, according to the season, from two to five gallons per cask, the summer or early pilchards always yielding more oil than those taken in October or November. The salt employed in *curing* the fish is afterwards with the filth proceeding from them used for manure.

The St. Ives seine fishery does not differ materially from that in Mount's-Bay, except that in the latter place, owing to the greater depth of water, the seines

are four or five fathoms deeper: and as there are no *stop-nets* in Mount's-Bay they are also longer. In Mount's-Bay, too, the fishing-ground being very extensive, all the seines can be employed at once without waiting for their turns, and on that account each seine-boat is *always* attended by two others, the larger one being called the *follower* and the small one the *cock-boat*. There are however in Mount's-Bay some places for fishing more favorable than others, and these are taken in turns.

Besides the method now described of capturing pilchards with deep nets in shallow water in the day-time, there is a far more common mode of capture, by meshing them in shallow nets in deep water by night. As these *drift* nets are always spread in the open sea where they might be destroyed by vessels sailing over them, their head-ropes are sunk two or three fathoms below the surface and kept suspended at that depth by cork buoys affixed at regular intervals. By this contrivance, suggested by the late Dr. Penneck, not only are the nets preserved but larger quantities of fish are taken. These nets, each with its *driving-boat* attached, are left to *drive* or go with the wind or tide all the time the net remains in the water.

As soon as the pilchards caught by the *seines* or *drift-nets* are landed, the neighbouring towns and villages are supplied at a very moderate price with whatever quantity they wish, and the rest, when cured and placed in *hogsheads*, are exported to the Mediterranean, where during Lent they generally bring about 50*s*. per *hogshead*. The quantity consumed at home is comparatively inconsiderable: before the Cornwall railway was opened they were when most plentiful sold at the boats for 1*s*. or 1*s*. 6*d*. per 120, whilst mackerel when thus sold brought from 5*s*. to 8*s*. per 120. Mackerel are not exported, but consumed either here or in the northern or eastern counties, to which

the steam-boats or railways carry them. In 1860 fish to the value of £80,000 was sent from this district to the London and large provincial markets.[7] There has never been so great a number of men employed in building large fishing-boats in Mount's-Bay as during the last year or two, and this activity will be continually increasing, as the demand for fresh fish must for a long while yet greatly exceed its supply. The boats, too, which are now built are larger by some tons than their predecessors. The fine boat which a few years since sailed alone from Mount's-Bay to Australia, the longest voyage ever accomplished by so small a boat, was only about 16 tons burden.

Whilst this district is thus periodically visited by larger shoals of full-sized pilchards than any other in Europe, it possesses also more kinds of fishes than any other locality of equal extent. In Mount's-Bay, on the south, the fishes closely approximate those of the "Mediterranean, and from the rareness of some species they must actually reach us from that distant spot.[8] * * * * On the north, while there is an identity with the south in what may be considered as Cornish fish, and while they may occasionally receive a straggler from the south, yet their productions are modified by visitors from the north. The true sprat, which rarely visits the south, is frequently found in large shoals in all parts of our northern waters. At the Land's-end we are sometimes visited by the inhabitants of the Atlantic, and in the autumn not unfrequently by the larger fish from tropical America."[9] "It appears from

[7] "West Briton," 8th Feb., 1861.

[8] Mr. Couch has described the only two specimens of the long-finned tunny (*Orcynus ala longa*, Cuv.) captured in Britain, and these were caught in Mount's-Bay. Trans. of Penzance Nat. Hist. & Antiq. Society, I. pp. 45, 95.

[9] Trans. of Penzance Nat. Hist. & Antiq. Soc., I. p. 119.—See also in *The Zoologist* (IV. v. VI.), Mr. Couch's "Notes on the Fishes

Mr. Yarrell's excellent account of British Fishes that a large proportion of the rarer species was found in our bay.'

But there are inhabitants of the sea on the coasts of this district infinitely more numerous than all that can be seen by the naked eye. When on the Promenade in Penzance, on 22 July, 1856, between ten and eleven p.m., I saw the larger billows as they broke on the shore illumined with a beautiful phosphorescent light. In going down to the sea-side to observe them more closely the sand which had been left by the ebbing tide shone wherever I walked. At every step my foot was instantly surrounded with a broad fringe of light studded with brilliant points, which continued two or three seconds. Each handful of sand which I took up had also twenty or thirty of these little stars, not in clusters, but all pretty equally distributed: the little cavities too which I thus made in the sand, however deeply I thrust my hand, were all lined with the same profusion of stars, which disappeared after two or three seconds. When stones were thrown into the sea the luminosity appeared, not only where the stones entered, but as far as the falling drops extended. The waves as they broke seemed to shine, not from star-like points, but with an uniformly diffused and continuous light—owing probably to the impossibility of distinguishing the direct from the reflected light of the luminous points. The day had been foggy and sultry, and in the evening the fog became very dense with small rain: the barometer was falling and the thermometer 65° with a gentle air from the S. or S.E. The following day was also sultry and the sea continued calm.

of the Land's-end," which are characterized by Mr. Newman, the conductor of that Journal, in his preface to vol. 4 (1846), as "the most valuable and interesting record of the habits of fishes that has ever been published." Mr. Couch's name and that of his father have been given to some species of fishes and *Crustacea* discovered by them.

On the night of 30 July, 1856 (eight days afterwards), I witnessed a similar phenomenon in the same locality. Although the waves were not quite so luminous, every part of the sand from which the sea had retired exhibited, wherever I stamped, the same profusion of brilliant points. This day also had been very calm and sultry, the thermometer 67°—the barometer 30·40. The following day was the hottest of the year at Penzance, and the air very calm and clear.

On these occasions, particularly when the night is dark, if a fish rise from the calm water a most brilliant and beautiful effect is produced. And were you from a boat to look down into the sea while fishes were darting to and fro' their paths would be luminous, and the deep would be traversed by streams of light as bright and beautiful as those of stars shooting through the sky. If you draw in your fishing-line it will appear as a *line* of fire and the fish at the end of it like a *ball* of fire coming towards you. A net suspended in the sea appears "like a brilliant lace-work of fire," and the fishes may be seen carefully avoiding it. When fishermen by night wish to know whether any fish are near they stamp on the bottom of their boat, and instantly, if there are any beneath, they will be seen darting away in all directions. By this means in some parts of Cornwall the seine fishery is pursued by night.

This luminosity *(brimming* or *barning)* of the sea, produced by microscopic animals and observed in winter as well as summer, is not confined to bays or shores, but occurs in all parts and at all visible depths of the ocean, from the equator to the poles (although most brilliant within the tropics), so that the mind is almost overwhelmed with the idea of the vast multitudes of living creatures inhabiting the waters.[10]

"Whatever (says Mr. Couch) may be the result of observations made in other parts of the world,

10 Gen. i. 22.

the luminosity of the sea as exhibited in Mount's-bay is the product of small animals extensively diffused through the waters. These creatures do not yield their light except under excitement or irritation; and as soon as the causes have passed away the light disappears. The vital and animal character of the phenomenon is easily tested. If a portion of phosphorescent water be taken up and its temperature increased, specks of light are apparent in every part: if these be carefully taken up and placed under the microscope their nature is immediately detected: we not only discover that the light arises from a minute animal, but the part that gives it out is clearly exposed to view. If you place any of our *Crustacea* in cold water and then place them over the fire, luminous specks make their appearance in all directions, and these also on examination are found to be minute parasitic animals. The creatures having these luminous properties, that have been examined on our own shores, are minute and undescribed *Crustacea,* gelatinous *Medusæ*, the *Pholas*, and several species of worms, all of which have been examined in a state of incandescence."

"The circumstances under which this luminosity is the most brilliant are the prevalence of south winds with misty and wet evenings. During the cold weather and northerly winds of winter it is rarely to be seen: and at these periods if the water be examined very few of these light-giving creatures can be detected."[11]

"Our seas are also (says Mr. Couch) rich in various species of coral;" and a list of some of our salt and fresh water *Zoophytes* is given in the "Guide to Penzance," Appendix, p. 49: and in Mr. Couch's "Additions to the list of Cornish *Zoophytes.*"[12]

As the sea in Mount's-bay retires to a great distance on both sides of Penzance, the naturalist may obtain a

11 Trans. of Penzance Nat. Hist. & Antiq. Soc., I. p. 278.

12 Ibid, for 1851, p. 37.

great variety of marine animals by turning over the stones near the line of low-water. He could also often supply himself on the beach between Penzance and Marazion, in summer evenings, when men are engaged in "*blind hauling*" or casting a drag-net into the sea from a boat moving along shore, and immediately drawing it to land. If fond of boating he might use a small dredge. And the trawlers and other fishermen could always furnish him with an abundant supply of marine productions which they would otherwise throw away as useless.

This district, too (as Mr. E. H. Rodd, the best authority on the subject, informs me), is more interesting to the ornithologist than any other locality in our island. It is especially so, not so much on account of its own numerous land and sea birds as by reason of the great variety of migratory birds by which it is visited.[13]

Of all Cornish birds the greatest favorite appears to have been the Cornish chough (*Corvus graculus*), a species of daw distinguished by a red bill and red legs and feet, its plumage being entirely black. Some of the most ancient Cornish families have borne it in their coats of arms. It seems identical with the *Pyrrhocorax* of Pliny, which he thought peculiar to the Alps, but which appears to be there only in the winter. Borlase, who gives a long account of this bird, considered it to have been named the Cornish chough because "it is found but rarely and at times in other countries, but constantly in this county."[14] This bird has now entirely disappeared from the Land's-end district. The last place where it built is the "funnel" of Tol-pedn-Penwith (p. 188). In 1849 I saw four of them in Porthgwarra cove a few months after they had been

[13] See Mr. Rodd's numerous ornithological papers for many years past in the Reports of the Royal Institution of Cornwall, and in *The Zoologist*.

[14] Nat. Hist. of Cornwall, p. 243.

taken from a nest in that "funnel." I saw them—first, in the little shed wherein they were kept—then flying at large to great distances and returning at the call of their captor as obediently as well-trained falcons. At first, when they were allowed to fly at large, the old birds which had hatched them in the "funnel" used to come and peck them most severely, as if punishing them for preferring captivity to freedom, but they were too kindly treated by their captor to have any desire for the liberty which their parents enjoyed. Another person in that neighbourhood had so trained a pair that they accompanied him in his most distant walks, and when hungry would alight at his feet and not suffer him to proceed until he had turned over some stones for them to pick up the worms beneath.

The *Entomologist*, also, will here find a rich field for his pursuits. A list of numerous *Lepidopterous* insects has been made by Mr. W. Noye.[15] A collection of *Coleopterous* insects in this district contained "nine entirely new species, besides four others new to Britain and a great many very rare ones. One of the *Carabideous* beetles will form a new genus."

Conchologists desirous of making new discoveries should devote a few days to the sand-hills of Phillack, where, throughout thousands of years, multitudes of land-shells have been annually buried on the constantly rising hills, and may be now found entombed in perfect preservation. Many species not now existing either in Cornwall or in England would thus probably be discovered—and perhaps some extinct species. Out of the twenty-six species gathered there in only two hours, as already mentioned (p. 157), not less than four had ceased to exist in this county. Forty-eight species of our land and fresh-water shells have been noticed by Masters John and Thomas Hennell.[16]

[15] Trans. of Penzance Nat. Hist. & Antiq. Soc., i. pp. 90, 164, 203.

[16] Ibid, p. 251.

The *Flora* of this district is likewise "in some respects more comprehensive than that of any district of equal extent in Britain."[17] Master R. T. Millett, with the assistance of Mr. Ralfs, has given a list of 200 species of *Fungi* found here, "several of which are new or have never before been described as British.[18] Lists have been made of many of our *Algæ* by Mr. Ralfs;[19] of 148 of our *Lichens* by Master F. Pentreath;[20] of 140 species of our *Mosses* by the late Mr. Greenwood, who observes that "in those tribes of *Cryptogamia* which have received the greatest share of our attention the number of species discovered in this neighbourhood equals, if not exceeds, that of any tract of similar extent throughout the kingdom."[21] And such is the mildness of the climate that the myrtle, hydrangia, fuchsia, verbena, and geranium, although exposed throughout the year, grow to a great height and flower most luxuriantly in their seasons. Plants, indeed, which in almost every locality of Britain would perish or be checked by the frost, continue to grow here throughout the coldest part of the year: and this district consequently yields in January, February, and March, abundant crops of very fine full grown brocoli,[22] and in April and May an equal abundance of potatoes—from which two classes of vegetables tens of thousands of pounds sterling are realized annually by their sale in the London and other markets several weeks earlier than they could be procured any

17 "Guide to Penzance," 1845, Appendix, p. 2; at the end of which are lists of our *Phœnogamous* plants and *Ferns*, *Mosses*, *Hepaticæ*, *Lichens*, and *Algæ*.

18 Trans. Penzance Nat. Hist. & Antiq. Soc. for 1852, p. 91.

19 Ibid, for 1850, p. 377; and 1851, p. 23. The name of this Author is given to several species of plants discovered by him, and also to an entire genus of *Algæ*—*(Ralfsia)*.

20 Ib. for 1851, p. 24. 21 Ib. for 1846, p. 60.

22 In 1860, owing to the unusually early rains and mildness of the

where else in Britain. No sooner are these early crops removed than the land is planted with other vegetables, and thus produces two crops in the year, as recorded before the Christian era (p. 20).

But whilst the neighbourhood of Penzance produces such early crops, it is not adapted for bringing wall fruit to perfection: for our summer heat is as much below, as our winter temperature is above, that of the rest of England; and although we have not in absolute quantity quite so much rain as most localities in Britain, yet it rains here more frequently. From the Meteorological Journal kept at Penzance by the late Mr. E. C. Giddy, it appears that during the nine years, 1821–1829, the average number of days in the year on which rain or mist fell was 180; whilst the average number of days on which no fall whatever occurred was 185. The wettest year was 1824, and the number of wet days was then 225. The driest year was 1826—and the number of dry days was then 251. The mean of the annual maxima of the thermometer during the same period was 75°:—the mean of the annual minima, 26·5°.[23] Sir James Clarke observes that "aged invalids, with whom, in general, a soft climate agrees, and to whom, even a moderate degree of humidity is not objectionable, might more particularly derive benefit by residing during the whole year at Penzance.

weather, the earliest planted brocoli attained their full size some weeks before Christmas, and large quantities at that very early period found their way to the London markets. But the severe cold at Christmas —the severest known in England—killed all not gathered whose flowers were too large to be protected by the leaves. In the following January and February the later planted brocoli became ripe and were sent to the same markets.

23 "The mean temperature of Penzance is 51°—that of Sandwich, in Orkney, 46°. The climate in fact is nearly identical. The great expanse of the adjoining sea equalises it in the southern parts, and further north the Gulf-stream sweeps towards the coast and saturates with tepid waters and vapour the shores of Sutherland and the Orkneys."—*Edin. Review*, Jan. 1851, p. 75.

The great mildness of the winter would enable them to be much in the open air, and they would have less to dread from the coldness of the nights than in any other part of England."

This district, too, excels all others of equal area in England for variety of sublime and beautiful scenery. Although so many of its land and sea views have been already pourtrayed, a far greater number with yet unpenciled features of sublimity and beauty are still waiting to catch the eye of the observant artist. The distant cliff-scenery we have already noticed. The walks within two miles of Penzance now demand our attention. Green hills, winding valleys, ivy-covered carns, crystal streams, avenues, and groups of forest trees, orchards, and gardens constitute their most prominent features; whilst paths, intersected by stiles level with the ground, traverse the richly cultivated fields in all directions, disclosing ever varying and ever lovely prospects. St. Michael's-Mount is the crowning object of very many of them—but each new vista through which we behold that "beauteous gem" is itself so beautiful that it is often difficult to determine which to admire most—the gem or its setting, and we are only sure that "each gives each a double charm." The bay beheld from some places resembles an extensive lake. Seen from others it appears like one, two, or more small sheets of water surrounded with woods and meadows, the Mount occupying the centre of one of them. From yet other spots it has the appearance of a large navigable river. And when we view it as it really is—a broad, deep, and noble bay, the finest in England, the chameleon-like changes which it undergoes are often very striking. Now the air is so clear, or its refractive power so great, that the beautiful long tract of table land terminating in the Lizard point, appears five times nearer than it actually is (p. 122). Now again so dense a fog covers the land on each side

of the bay, (the sea itself being free from it) that both arms of the bay seem to have vanished and we can scarcely believe that the clear sea we behold is part of a deep bay. The Mount too when a thick fog rests exclusively on its upper or lower half, has a most sublime appearance, particularly if the visible part be looming or looking nearer or larger than usual: in the latter case, it vividly resembles a huge castle in the air, in the former the crater of an extinct volcano. In a drive of less than eight miles to Newlyn, Madron, and Gulval (west, north, and east of Penzance), no part of which is a mile and a half from the town, we cross or pass nine roads leading respectively to Mousehole, St. Paul, Land's-end, St. Just, Morvah, Zennor, St. Ives, Ludgvan, and Marazion, all excellent parish roads free from toll, and connected with each other in various directions by paths through fields. There are also within a mile of Penzance several private roads leading to neighbouring villas; and, although the public have not access to them in carriages or on horseback, they are always at liberty to walk there.

For a view of the sea in a storm, the visitor should stand under the shelter of the house nearest the Battery, where the huge waves rolling in from the Atlantic dash against the rocks and against each other in every possible direction. Within the pier at this time the sight is still more magnificent. As each large wave breaks against the wall, the spray rises high above the masts of the ships and descends in such a deluge on the quay with its balconies and raised walks, that the whole is changed for a few seconds into a grand cataract. On these occasions the sun sometimes shines through the opening clouds and decorates the falling drops with all the colours of the rainbow. During such tempests it is a stirring sight to behold the large fishing-boats and vessels caught by the storm, entering the pier for safety. Whenever a severe storm from the south-east coincides

with a spring tide, the waves dash against the wall of the western esplanade throughout its whole length, and some parts of the road to Newlyn are so washed by the spray, that persons going thither are obliged to take a circuitous route by the way of Higher Lariggan.[24] Not less sublime on these occasions is the sight from the eastern esplanade, where the huge waves reflected from the back of the northern arm of the pier, are seen crossing, at various angles, those advancing to, or retreating from, the wall of the Railway.

A beautiful contrast to such wild scenes often occurs during a calm, in large pools on the sea-shore between Penzance and Marazion, near low-water. On such pools a retiring billow occasionally meets an advancing one at an angle so acute, and the splash of their collision, beginning at one end and running rapidly to the other, is so loud and sudden, that a stranger walking by, without having noticed the two billows before their meeting, would be quite sure a large fish had suddenly darted across the water and would probably try to capture it.

A strong north-east wind has been blowing for some days, and vessels bound up the English and Irish Channels have been beating into the bay and anchoring under the shelter of the land until the bay is almost filled with ships waiting for a change of wind, their lights by night being as impressive a sight as the fleet itself by day. The wished-for change arrives, the forest of masts is immediately clothed with flowing canvass, and Mount's-bay has the appearance of a grand regatta, in which the steam-boats with their long trains of smoke worming their way through the white sails add considerably to the general effect. A more picturesque and much more frequent kind of regatta is

[24] By the storms of 19 Jan., 1817, and 24 Nov., 1824, large boats near Lariggan bridge were swept across the road far into the adjoining fields ; and the pier of Penzance was greatly damaged.

when one or two hundred *driving*-boats equipped alike, each with two masts and two brown lug-sails, and from seven to twenty tons burden, are following one another out of the bay in an afternoon for a night's fishing.[25]

No town in England possesses more clean and pleasant places for open sea bathing than the Penzance Battery rocks and the beach between them and Newlyn —the latter being well supplied with bathing-machines. In neither place is there ever any dangerous current, and the sea is rarely too rough for bathing. The town is well drained and the houses in every street abundantly supplied with excellent water from two large reservoirs a mile distant, of sufficient elevation to carry the water to the tops of all the buildings. The Promenade and numerous walks through fields and private roads are neither dusty in dry weather nor muddy in wet, and many of them are so shaded in summer and sheltered in winter, that from whatever direction the sun may shine or the wind blow the invalid may always find a well shaded or a well sheltered walk for his daily exercise. Commodities of almost every description may be bought at the shops, just as cheaply as in London: and provisions of all kinds in excellent condition, particularly fish, poultry, butter, and vegetables, are very much cheaper than in London. The beef, mutton, and pork are small, but of excellent quality. In the gardens or windows of most of the laboring classes flowers are cultivated—a fact which tells volumes in their praise, as the love of flowers

25 This may be seen seven months out of the twelve, but not near Midsummer, as the boats are then for about two months on the coasts of Ireland engaged in the herring fishery—nor in December, January, and February, the former part of which period they are on shore undergoing repairs, and the latter part off Plymouth on the mackerel fishery—nor on Saturdays, when early in the morning, if the weather be fine, the fishermen run their boats on shore at high-water, spread their nets on the sand to dry, and in the afternoon take them again on board, and rest all Sunday.

is generally associated with a gentle disposition, cleanliness, industry, and many social virtues. The gentry of Penzance and its neighbourhood are numerous; and strangers in whatever rank they have been accustomed to move, and whether religious, scientific, literary, or otherwise, may here meet with agreeable society, and with associates of kindred dispositions and pursuits.

Penzance has two chapels connected with the Church of England, a large and handsome Roman Catholic church in an unfinished state—the nave only being completed—and places of worship belonging to the Wesleyans, the Congregational Dissenters, the Baptists, the Association Methodists, the Brianites, and the Primitive Methodists, besides a Quakers' Meeting-house and a Jews' Synagogue.

The Penzance Public Library contains about 9,000 volumes, most of them valuable books of reference. It admits members at one guinea per annum, and other subscribers at half a guinea per quarter. To the Library and News-room of the "Penzance Literary *Institute*" the subscription is only 2*s.* 6*d.* per quarter, which includes admission to its weekly lectures during the winter. The "Penzance Literary *Institution*" has no library nor news-room: the admission to its weekly lectures is 1*s.* 1*d.* per quarter. Here are also religious and other circulating libraries and Gentlemen's and Ladies' book-clubs, classical and commercial schools, a "National" school, and a "British" school. The Gentlemen's News-room is attended by fifty annual, and an unlimited number of monthly, subscribers. A very large and valuable collection of minerals occupies the museum of the Royal Geological Society of Cornwall, to which any member may introduce a stranger. The museum of the Penzance Natural History and Antiquarian Society, which is open to the public, is filled with birds, fishes, insects, sea and land shells, ancient and modern coins, ancient sepulchral urns,

mill-stones, celts, and other antiquities, and with models of our cromlechs, hill-castles, Boscawen-un Druidical Temple, Madron Well ancient Chapel, &c.

Before the Cornwall Railway was opened in 1859 this remote district with all its attractions was almost unknown out of Cornwall—but since that event the visitors from all parts of Britain have been so numerous as to make it often difficult, and sometimes impossible, for the keepers of hotels and lodging-houses to accommodate them. A very large and handsome hotel, however, has at length been opened on the Marine Parade, furnished with every accommodation that visitors can desire. It is a noble building, and a great ornament to the town, the architect being Mr. John Mathews, by whom the still more splendid new banking-house of Messrs. Bolitho was erected, and to whom the town is indebted for the excellence of its sewerage and of its supply of water.

From the foregoing pages it appears that no district of equal size presents so many attractions as this to the antiquarian (pp. 1–75); to the observer of extraordinary agitations of the sea (76–111); to the meteorologist, electrician, agriculturist, and mariner (112–147); to the geologist (148–163); tourist (164–217); mineralogist (202); fisherman and ichthyologist (218–229); sportsman and ornithologist (230); entomologist and conchologist (231); botanist (232); invalid (233); to artists, and the lovers of the sublime and beautiful (234): but, of all its "attractions (says Mr. Halliwell[26]) surely the greatest is the genial character of the people, which would almost suffice to make a desert an agreeable place of sojourn to a stranger."

The next chapter will be a chronological account of some of the most remarkable facts in the History of the capital of this district.

[26] Rambles in Western Cornwall, p. 217.

CHAPTER XVII.

CHRONOLOGICAL HISTORY OF PENZANCE.

NORDEN says, "Pensans signifieth the head of the sande," p. 40: it being situated on a headland in the inmost part of Mount's-bay, with a long sand-bank on each side of it. But as a chapel, dedicated to St. Anthony, stood on this headland, Pensans most probably meant "the holy head." The Town-arms, however, —St. John the Baptist's head in a charger—were not, as some have supposed, "a quaint device to express the name of the town,"[1] but simply pointed to the day of its most ancient annual festival, when the church commemorates St. John's martyrdom. The walls of St. Anthony's chapel were standing, not a century since, on the west side of Barbican street leading from the Quay to the Battery, but were soon afterwards taken down and a fish-cellar erected in their place: on which occasion a cross which had stood on a bracket or projection from the western wall of the chapel and near the font was used as common building-stone. When the cellar was rebuilt in 1850 the relic was, by the praiseworthy care of Mr. Rodd, the solicitor of the absent proprietor, preserved from further desecration, and may now be seen in St. Mary's churchyard. It is a very rudely carved piece of Ludgvan-granite (with mica of silvery hue), bearing on one side, it may be, a seated figure, and on the opposite side a crucifix not unlike that on the cross in the churchyard of Sancreed, which "represents our Lord, crowned and wearing a kind of tunic which reaches to the knee." Three other ancient crosses in this district have each a crucifix on one side and a sitting figure on the opposite side. That dug up in St. Ives churchyard "represents on one side the holy

[1] Drew's Cornwall, II. p. 438

family; and on the other side the crucifixion."[2] That standing on the north-east side of the Mount on a tall modern shaft has a crucifix on one side and a seated figure (probably the Blessed Virgin) on the other. That on the steps leading from the terrace into the chapel of the Mount bears also a crucifix on one side and the seated Virgin and Child on the other.[3]

2 This is No. 17 of the "Specimens of Ancient Cornish Crosses, Fonts, &c." by F. C. H., published in 1850 by J. R. Netherton, Truro: amongst which are engravings also of the crosses in this district bearing figures of our Lord;—on Lelant downs (No. 4); Sancreed churchyard above mentioned (No. 5); St. Levan churchyard (No. 12); St. Just church-town (No. 13); St. Buryan church-town, near the entrance to the churchyard (No. 14); near the Sanctuary, St. Buryan (No. 21); St. Buryan churchyard, near the entrance to the church, and raised on four steps (No. 34); and on the south side of St. Michael's Mount (No. 22): which last has on its southern face, "in the circular head of the shaft a Greek cross, beneath which, within another circle, is a rude figure of our Lord, and under that a Latin cross, evidently of more recent work than the others:" its northern face is occupied wholly by a Latin cross.

3 This very elaborately wrought cross does not consist of any stone found in this district, but of what is said to be Norman elvan. The same kind of stone constitutes what seems the capital of an ancient pillar close by it, on which are carved winged figures bearing shields on their breasts. Part of the arched door-case (on the same terrace) leading into the modern 'drawing-rooms consists of the same dark stone: and so does the corbel which now supports one of the pillars of the recent balustrade of the terrace. This corbel originally (says Polwhele, II. p. 189) projected into the ancient Nunnery from its south wall, and "served no doubt to support the image of the Holy Virgin," ("and I find the nuns here as early as Richard the First"). Of the five shields on it three are blank, one is embossed with three *fleurs de lis* and a *chevron* between, "perhaps the arms of St. Michael's Mount in Normandy," and the front escutcheon has "three castles, two and one garreted—the arms at present of the town of Marazion and formerly perhaps the arms of this Priory:" but all the castles are flat on the top and have battlements, whereas the castle on the Marazion Corporation seal is, in each of its three towers or divisions, without battlements and in the form of a dome (p. 13). The arms of Marazion, however, as engraved on the very handsome maces of the corporation, differ from those on the seal, in that the central tower is in the form of a mitre, as if indicating its connexion with the

1087. 20 William I. The parish of Madron, which includes Penzance, was taxed (according to Hals) as part of the Manor of Alwarton belonging to the kings and earls of Cornwall (p.166), the name Alwarton (now Alverton) being derived from Alwardus, who possessed it in the time of Edward the Confessor.[4]

1332. Edward III. granted to the town built on this manor a weekly market on Wednesdays and a fair of seven days' continuance at the festival of St. Peter.[5]

1397. St. Mary's chapel was licensed.

ancient ecclesiastical establishment on the Mount: but I cannot learn from what source the engraver of the maces derived the mitred tower. To see this corbel you pass through a door on your left in ascending to the castle.

As I have not again to speak of the Mount, I must here correct an erroneous statement at the bottom of p. 12, made to me by some members of the Corporation of Marazion when I was preparing its Addresses to Her Majesty and to the late Prince Consort, Albert the Good, on the occasion of their landing at the Mount in 1846.—*St. Michael's Mount is not and never was included in the Chapelry of Marazion.*

Again, on p. 168, the lines 15–22, which I derived from D. Gilbert's Cornwall, II. p. 213, should be displaced by the following:—"In 1657, the Basset family having suffered much in their property by the civil war, sold the Mount to John St. Aubyn, M.P. for the county of Cornwall. Six of that name have successively been its proprietors, and Mr. John St. Aubyn, one of the present members of parliament for West Cornwall, has occasionally resided there." Thus the Mount has remained in one family more than two hundred years. The same family has held an estate in this district more than twice that period as already stated (p. 178): and Kymyell Mill, part of that estate, has been held uninterruptedly under the St. Aubyns by the same family of tenants from 1380 (Richard II.) down to the present day. So long a connexion between landlord and tenant is, I believe, unparalleled; and both families are doubtless quite proud of it. The Cornish are proverbial for their constancy, but an instance like this I certainly had not anticipated.

4 D. Gilbert's Cornwall, III. p. 79; & Drew's Cornwall, II. p. 437.

5 Drew's Cornwall, II. 439. The chief market day at Penzance is now Thursday. The fair of seven days was probably the immemorially observed Midsummer festival, beginning with Midsummer-eve and ending on St. Peter's-day (p. 66).

1429. Another chapel, dedicated to Saints Gabriel and Raphael, was licensed. As two chapels were not then probably required for Penzance, this may have been a temporary one whilst St. Mary's was being enlarged.

1512, March 16. Grant of Henry VIII. to Pensans of the profits from the "ankerrage, kylage, and busselage" of all ships, upon condition of keeping the quay and the bulwarks of the town in repair. This grant is still in possession of the Corporation.

1540. Leland, writing about this time, says, "Pensants ys the westest market towne of al Cornwayle and no socur for botes or shyppes but a forsed pere or key. There ys but a chapel yn the sayd towne as ys yn Newlyn: for theyr Paroche Chyrches be more then a myle of." [6]

1595, July 23. Two hundred Spaniards landed from four or five galleys near Mousehole and burnt that town, as well as the parish church and "church-town" of St. Paul. They then re-embarked and anchored near Newlyn, where four hundred men landed, who after burning that town marched on to Penzance, which also they set on fire.[7]

1615, May 9. Charter of James I., vesting the government of Penzance in a Mayor, Recorder, eight Aldermen, and twelve Common Council men.

1646. Hals states that in this year the parliamentary forces "for two days had the plunder of the town," on account of "the kindness and charity the inhabitants" had shewn to the king's "troops of horse driven into those parts by Sir Thomas Fairfax." [8]

1648, June. Penzance joined with other parts of Cornwall to restore the fallen king: for which outbreak

6 Itin., VII. fol. 119.

7 Carew (Lord De Dunstanville's edit.), p. 381; and Drew's Cornwall, II. p. 531.

8 Gilbert's Cornwall, III. p. 81.

the town was again plundered by the government forces.[9]

1656. Date of the first entry in the Corporation account-books, when the Quay was let for £25 and the Market for £67.[10]

1663, Aug. 18. Charter of Charles II., constituting Penzance a coinage town for tin. In 1838 the coinage ceased, a compensation to the Duchy in the form of an annuity from the Consolidated fund having been granted by 1 & 2 Vict., c. 120, in lieu of the prior duties. The word *coinage* is derived from *coining*, or striking off a corner of each block to ascertain its quality before the dues were paid and the block stamped with the seal of the Duchy.

1680, Aug. 4. In the printed translation, now before me, of the deed of gift of St. Mary's chapel and chapel-yard from the corporation of Penzance to the bishop, preparatory to their consecration, it is stated that the chapel "was long ago built but never consecrated," and the town is called "Buriton otherwise Penzance." But Mr. Courtney, in his *Guide to Penzance* (p. 7), says, "we cannot discover that the word *Buriton* was ever used before the charter of James I. made this 'the *borough town*[11] of Penzance.' When or how it obtained this name we are unable to discover." Prior to its consecration this year the chapel was endowed by Mr. John Tremenheere with land, let in 1862 for about £15 per annum, which endowment has since been twice augmented from Queen Anne's Bounty.

9 Guide to Penzance, p. 15.

10 I have given numerous extracts from these books in my Statistical account of Penzance and Madron, published in the Quarterly Journal of the Statistical Society of London, for July, 1839: but still more copious extracts are in the *Guide to Penzance*, published in 1845.

11 These two words and *Buriton* I have distinguished by italics, the quotation being suggestive of the idea that *Buriton* is a mere corruption of *borough town*.

1745. The rebuilding of the pier being completed, the corporation, to defray the expense, sold the advowson of Madron, Penzance, and Morvah to Mr. John Borlase for £800.

1747. The Quay let for £126 : 10*s.* and the Market for £120, both having gradually increased in value since 1656.

1760. An Algerine corsair of 24 guns wrecked in Penzance near the Battery rocks, the captain having imagined himself safe in the Atlantic.[12]

1768. The first three Friendly Societies formed at Penzance, for relief in sickness, &c.

1770. The Penzance Ladies' Book-club established.

1778, Dec. 17. Sir Humphry Davy born at Penzance. The copyhold estate, near Penzance, on which his father's family resided for many generations as proprietors is called indifferently Varfell and Barfell—V and B being convertible letters. And, singularly enough, the third letter of the royal name (David) from which that of Davy is derived is not V in Greek, but B—the other four letters being the same as in the Hebrew, Latin, and English. In the Cornish language we have similar examples in the words *Trebeor* and *Treveor* "great town"—*Trebean* and *Trevean* "little town." I have in my possession the original manuscript of his *Essay on Heat and Light*—written rather closely on sixty-four quarto pages in a very legible hand with very few alterations, and thus subscribed by him,—"June 1798. Humpʸ. Davy." I have also the counterpart of his indenture of apprenticeship to Mr. (afterwards Dr.) John Bingham Borlase, with whom he studied medicine at Penzance;—it is dated 10 Feb., 1795. But, before he was twenty years of age, he left Penzance for Clifton to superintend the Pneumatic Institution established there by Dr. Beddoes and others for trying the medicinal effects of different gases. At Christmas, 1821, when on a visit to his relatives, the

[12] Gilbert's Cornwall, III. p. 97.

last he made to his native town, the inhabitants entertained him at a public dinner. He died at Geneva on 29 May, 1829, in the fifty-first year of his age.

The following extracts from his life by Dr. Davy will shew the state of Penzance about the time of his birth:—

"I have heard my mother relate that when she was a girl, there was only one cart in the town, and if a carriage occasionally appeared it attracted universal attention. Pack-horses then were in general use for conveying merchandise, and the prevailing manner of travelling was on horseback;" "in the same town where the population was about 2,000 persons, there was only one carpet, the floors were sprinkled with sea-sand, and there was not a single silver fork. The only newspaper then circulated in the West of England was the Sherborne Mercury, and it was carried through the country not by post, but by a man on horseback specially employed in distributing it." "The lower class was extremely ignorant, and all classes very superstitious." "Amongst the middle and higher classes, there was little taste for literature, and still less for science, and their pursuits were rarely of a dignified or intellectual kind. Hunting, shooting, wrestling, cock-fighting, generally ending in drunkenness, were what they most delighted in. Smuggling was carried on to a great extent, and drunkenness and a low scale of morals were naturally associated with it." "The tide of change and improvement began to flow about the period that my brother was born."

1782. The Pier having been enlarged was let for £262, and the Market for £206—the former being more than double what it reached in 1747.

1798. The West Penwith Agricultural Society was formed, the first *Exhibition* of which was in 1811.

1799. The Gentlemen's Subscription News Room established.

1801 Population of Penzance 3,382. The Quay let for £367 and the Market for £320; each above £100 beyond its rent in 1782.

1803. Of the first battalion of Mount's-bay volunteers formed this year Col. Scobell is now (1862) the only surviving field officer, and my late father was the last surviving captain.

1809. The Penzance Public Dispensary and Humane Society established, for providing medical and surgical relief for any poor persons, wherever resident, except domestic servants, parish paupers, and members of friendly societies. Through no other institution here does a given sum communicate so much relief to the poor. At its annual meeting in 1854 it was announced that Miss Stone had left £1,500 (less £150 legacy duty) for this or any similar institution in Penzance which her Trustees might select, and that the Trustees had resolved to apply this sum for enlarging the Dispensary into an Infirmary as soon as a sum equal to itself be added to it. The additional sum, however, has not yet been contributed.

1811. Population of Penzance 4,022, which exceeded that of 1801 by 640.

1812. The Quay let for £700, and the Market for £428, being respectively £333, and £108 more than in 1801.

1813. Addition to the pier completed: begun in 1811.

1814. Royal Geological Society of Cornwall founded at Penzance through Dr. Paris, afterwards president of the Royal College of Physicians. Her Majesty is its patroness: and Albert Edward, Prince of Wales and Duke of Cornwall, subscribes £20 per annum. Its first president was Mr. Davies Gilbert, M.P. & P.R.S.—on whose decease Sir Charles Lemon, M.P. for the county of Cornwall, succeeded, and continued president many years until his retirement from public

life. The president now (1862) is Mr. Augustus Smith, M.P. Its printed Transactions rank high in the scientific world. Its museum contains a large and excellent collection of Cornish and other minerals, with a great variety of fossils. Its library comprises some of the best works on Geology, Mineralogy, and Palæontology, besides the Transactions of several Societies of this and foreign countries, the Edinburgh Philosophical Journal, the London & Edinburgh Philosophical Magazine and the lithographed signatures of the members in 1833 of the British Association. A catalogue of the books is given in the Transactions for 1844.

1815. Penzance had a very narrow escape from instantaneous destruction during a fire at the Quay in Mr. Batten's cellars, then containing three tons of gunpowder. By the intrepidity of Mr. Pearce and others the barrels were removed after the flames had entered the room in which they were lodged. The same gentleman, thirty or thirty-five years afterwards, when mayor of Penzance, ran far greater risk of his life in saving the town, when a house in the market-place was on fire containing several barrels of gunpowder which the flames had almost reached. To him the silver medal, dated 30 October, 1851, of the Royal National Institution for the preservation of lives from shipwreck, was presented, "in appreciation of his humanity and intrepidity in having gone off, and always taking the lead, to upwards of forty wrecked vessels, and thereby, under Divine Providence, having assisted to save a large number of lives." In his possession is the gold medal mentioned in C. S. Gilbert's Cornwall, II. p. 165, presented for distinguished services to his ancestor Brigadier General Jones by Prince Charles of Austria, afterwards Charles III. of Spain.

1816, July 30. Addition to the Penzance Chapel-yard consecrated.

1818. Public Library and Savings Bank formed.

1819, Aug. 25. Herbier House struck by lightning.

1821. Population of Penzance 5,224, being 1,202 more than in 1811.

1822. The Quay let for £952—£252 more than in 1812, an act of parliament for higher dues having been obtained in 1817. The Market let for £498.

Aug. 17. A very large hay-rick in the Union Hotel yard spontaneously burst into flames and continued burning for thirty-six hours: providentially there was no wind.

1831. Population of Penzance 6,563,—1,339 more than in 1821. The Quay let for £1,280 and the Market for £551.

1832, June 20. A very splendid meteor seen this night at Penzance, Redruth, Plymouth, and other parts of England, and in France, which I have described in the London and Edinburgh Philosophical Magazine of the following August.

July 29. The last sermon was preached in the late St. Mary's chapel-of-ease, which, instead of a tower, had a small white-washed spire.

Cholera in Penzance and Newlyn, but not in Mousehole or Marazion.

An unprecedented catch of pilchards by the seines on the eastern side of Mount's-bay a little before Christmas, and the boats from Newlyn were for a fortnight daily employed in carrying the fish thither until every cellar in Newlyn was filled, and all the salt consumed.

This year the Penzance Literary Institution, the first of the kind in Cornwall, was established. The next in Cornwall was formed in Redruth on 9 Sept., 1834.

1835, Nov. 15. St. Mary's chapel, the rebuilding of which commenced 17 August, 1832, was opened this day. It contains 2,047 sittings. The funds were furnished principally by the Corporation and private individuals, and partly by the church-building society.

1836. The Western District Cottagers' Gardening Society established, which at first had two exhibitions annually, but now only one.

1838. The present market-house was opened.

1839. The Penzance Natural History and Antiquarian Society established: in 1846 it began to publish its Transactions annually; the first volume of which was completed in 1850.

1841. Population of Penzance 8,578,—2,015 more than in 1831. The Quay let for £2,101, and the Market for £850.

Between 1811 and 1841 many streets and rows of houses were added to the town.

1843, April 18. The proprietary chapel in Clarence street was opened. This elegant building in the "Early English" style, which prevailed during the years 1230–1260, was erected at the expense of the late Rev. Henry Batten and dedicated to St. Paul, on the anniversary of whose conversion the foundation-stone was laid. It is 60 feet long, 22 broad, and 60 in height from the street to the top of the western cross. The extreme breadth at the transepts is 46 feet. The slates on the roof are in imitation of the tiling of Continental churches, cut and laid in the form of scales. The interior, as well as the exterior, is most carefully finished: the seating resembles that of the church of Stanton Harcourt, the benches being divided by arms into compartments which have thus the appearance of stalls. The roof is not ceiled: the timbers have gilt edges. "The approach to the chancel is by three bold steps, on the second of which rests the pulpit, hewn out of a single block of granite which weighed ten tons; it was designed from that of St. Peter's, at Oxford. On the upper step, which is continuous with the floor of the chancel, is a rail or screen of delicately wrought granite, the model being taken with some slight modifications from the parapet of Salisbury cathedral.[13] Within this rail are three other steps of granite, on which rests the altar of

[13] This rail, formed of only two blocks of granite, was, as well as the pulpit, a donation from Dr. Hocking, the amateur architect of this purely ecclesiastical edifice.

English oak elaborately carved, a copy from the Communion Table of Sunningwell Church, Berkshire. These, and the other parts of the chancel, seem a grouping of everything that is elegant in the various buildings from which they have been selected. The eastern and western windows are of painted glass in Willement's best style: the former contains figures of Christ, St. Peter, St. Paul, and the four Evangelists, under rich canopies; the latter, Moses, Aaron, the four greater Prophets, and St. John the Baptist: the colours of the draperies are extremely rich, and the whole are beautifully designed."[14] This design is highly significant: our Saviour and his ministers in the eastern window, looking upon Moses and the prophets in the western window, is well calculated to remind the officiating clergy, while facing the latter, that the more they study the Law and the Prophets, and understand the Old Testament, the more clearly will they expound the New.

1850. The Trinity House, on the application of Mr. Pearce, erected "iron cylinders surmounted with red balls, showing 15 feet above high water, one on the *Ryeman* and the other on the *Western Cressers*, two half-tide rocks a little within shore of the fair way line from the Mount Roads to Penzance pier, so that by keeping outside these beacons all danger is avoided."[15] The late Dr. Penneck, many years before, when Mayor of Penzance, erected a pole on the *Gear*, another half-tide rock, a mile south of Penzance, fixing it, like those above mentioned, in a strong iron socket in the rock.

1851. Population of Penzance 9,214. The Quay let for £2,251, and the Market for £701.

Dec. 31. The northern arm of the Quay was constituted "a legal quay for the lading and unlading of goods"—its foundation stone having been laid 7 July, 1845, during the Mayoralty of Mr. S. Pidwell.

1852, August 25. The West Cornwall Railway, which owes its existence almost entirely to the enterprising

[14] *Guide to Penzance*, p. 42. [15] *West Briton*, 1 Nov. 1850.

inhabitants of the Land's-end district, was opened during the Mayoralty of Mr. Pearce, who having been one of its most persevering and efficient promoters, was elected to that office, the fourth time, to preside over the festivities."[16]

[16] The following stanzas were printed on that occasion:—

I.

West Cornwall's great and noble work
Which hath this day been done,
Points to a work more noble still,
That soon must be begun.

II.

When *Eastern Cornwall* shall have made
The rail she now requires,
And iron roads connect Mountsbay
With all Britannia's shires;

III.

Then will this bay again become,
As in the days of yore,*
The greatest port in all our land
For foreign trade and store.

IV.

For it is more than five good leagues
Nearer each distant mart,
Than any other British place
From which our ships depart.

V.

This bay commands our channels, too:
In fleets, ships hither bend,
When storms prevent their passing round
The Lizard or Land's-End.

VI.

A harbour now is all we want—
A harbour broad and deep—
A harbour where the largest ships
May always safely keep.†

VII.

Then let us all, with heart and hand,
This needful work pursue;
And look on nothing yet as done,
While this remains to do.

R. E.

* pp. 12, 14.

† p. 171. The facilities of constructing a breakwater here are very great, and the Corporation of Penzance annually appoints a Committee for carrying out this object.

1859, May 2. Opening of the *Cornwall Railway*, which joins the *West Cornwall Railway* at Truro. The journey from Penzance to London is now daily accomplished in twelve hours. The old coach road was over the dreariest wastes of the county; the present railroad passes through scenery as beautiful and picturesque as any in England.

1860, June 12. The Lords Commissioners of Her Majesty's Treasury declared the limits of the Port of Penzance to be from the western side of the Lizard Point, and round the Land's-end, to Chapel-an-gather, in Perranzabuloe, extending to the distance of three miles seaward from low water mark, along the coast within such limits. And they also appointed the Quay of Penzance, 1,127 feet long, and the northern Quay of Penzance, 1,300 feet long, to be legal Quays for the lading and unlading of goods, the only other legal Quays within the Port being those of the *Mount* and *St. Ives*.

1861. Population of Penzance 9,414. The Quay let for £3,128, and the Market for £841. In the following year the Market brought £885, and the Quay 2½ per cent. beyond its rent in 1861.

Between 1841 and 1861 very few houses were built, but now the buildings are rapidly increasing.

No locality in Great Britain promises to reap, sooner or later, so much benefit from Railway communication as the Land's-end district (pp. 171, 205); and as its chief town is the capital of the Hundred of Penwith, which gave birth to one without whom there might not have been to this day a railway in the world, nor a steam boat plying on the open sea, a brief memoir of that eminent engineer will be a suitable Appendix to the little work which I have now concluded.

APPENDIX.

Contributions to the Biography of RICHARD TREVITHICK, C.E.

A distinguished man of old, to whom no statue had been raised, observed that he would rather men should ask, why a statue was *not* erected to him, than why it *was*. So, to the honour of Trevithick, the public are now inquiring why no account of his life and inventions has yet appeared, whilst persons who have done comparatively nothing for mankind have been rescued from oblivion by eminent biographers. One of the reasons, doubtless, is, that Trevithick was scarcely known except by his works, and few writers could produce a popular memoir out of such materials, unrelieved by those interesting personal details which constitute the very soul of biography. By his discoveries in the generation and application of steam-power, he has perhaps done more for commerce and manufacture than any individual of the present century.

The Institution of Civil Engineers has offered a prize for a memoir of Trevithick, which has not yet been claimed, although much has been published, in a fragmentary form, respecting him and his inventions. To these fragments I will now, from unpublished letters and other documents in my possession, make some interesting additions. I begin with a letter written by the late Mr. Michael Williams, one of the Members of Parliament for West Cornwall, to a gentleman then collecting materials for a memoir.

"TREVINCE, NEAR TRURO, *5th January*, 1853.

"DEAR SIR,—I am favoured with your letter of the 31st ulto., enclosing one from Mr. Francis Trevithick of the 24th idem., and have much pleasure in complying with your joint request to the best of my ability. I was well acquainted with the late Mr. Richard Trevithick, having had frequent occasion to meet him on business, and to consult him professionally; and I am gratified in having the present opportunity

of bearing testimony to his distinguished abilities, and to the high estimation in which the Cornish engineers of the day then regarded him. I need scarcely say, that time has not lessened the desire, in the county especially, to do him justice: as a man of inventive mechanical genius, few, if any, have surpassed him, and Cornwall may well be proud of so illustrious a son. At this distance of time, I can scarcely speak with sufficient exactness for your purpose of the numerous ingenious and valuable mechanical contrivances for which we are indebted to him; but in reference to his great improvements in the steam-engine, I have a more particular recollection, and can confidently affirm that he was the first to introduce the high-pressure principle of working, thus establishing a way to the present high state of efficiency of the steam-engine, and forming a new era in the history of steam-power. To the use of high-pressure steam, in conjunction with the cylindrical boiler, also invented by Mr. Trevithick, I have no hesitation in saying, that the greatly increased duty of our Cornish pumping-engines since the time of Watt is mainly owing; and when it is recllected that the working power now attained amounts to double or treble that of the old Boulton and Watt engine, it is impossible to over-estimate the benefit conferred by the late Mr. Trevithick on the mines of the county. The cylindrical boiler effected a saving of at least one-third in the quantity of coal previously required; and in 1812, I remember our house at Scorrier paying Mr. Trevithick £300, as an acknowledgment of the benefits received by us in our mines from this source alone. Mr. Trevithick's subsequent absence from the county, and perhaps a certain degree of laxity on his own part, in the legal establishment and prosecution of his claims, deprived him of much of the pecuniary advantage to which his labours and inventions justly entitled him; and I have often expressed my opinion that he was, at the same time, the greatest and the worst-used man in the county.

"As connected with one of the most interesting of my recollections of Mr. Trevithick, I must mention, that I was present, by invitation, at the first trial of his locomotive engine intended to run upon common roads, and of course equally applicable to tram and railways. This was, I think, about the year 1803; and the locomotive then exhibited was the very first worked by steam-power ever constructed.

"The great merit of establishing the practicability of so important an application of steam, and the superiority of the

high-pressure engine for this purpose, will perhaps, more than any other circumstance, do honour through all times to the name of Trevithick. The experiments made on the public road close by Camborne were perfectly successful, and although many improvements in the details of such description of engines have been since effected, the leading principles of construction and arrangement are continued, I believe, with little alteration, in the magnificent railroad engines of the present day. Of his stamping engine for breaking down the Black-rock in the Thames, his river-clearing or dredging machine, and his extensive draining operations in Holland, I can only speak in general terms that they were eminently successful, and displayed, it was considered, the highest constructive and engineering skill. As a man of enlarged views and great inventive power, abounding in practical ideas of the greatest utility, and communicating them freely to others, he could not fail of imparting a valuable impulse to the age in which he lived, and it would be scarcely doing him justice to limit his claims as a public benefactor to the inventions now clearly traceable to him, important and numerous as these are. From my own impressions, I may say, that no one could be in his presence without being struck with the originality and richness of his mind, and without deriving benefit from his suggestive conversation. His exploits and adventures in South America, in connection with the Earl of Dundonald, then Lord Cochrane, will form an interesting episode in his career; and, altogether, I am of opinion that the biography which you have undertaken will prove highly interesting and valuable, and I wish you every success in carrying it out.

"Believe me, my dear Sir, yours very faithfully,

"MICH. WILLIAMS.

"E. Watkins, Esq.,
"London and North Western Railway,
"Euston Station, London."

The locomotive referred to as "the very first worked by steam-power ever constructed," was also successfully tried in presence of tens of thousands of spectators in the summer of 1803 in London, in the vicinity of the present Bethlehem Hospital, and the neighbourhood or site of Euston Square. These trials were on the common roads; but shortly afterwards, "in 1804, one of these locomotive engines was in use at a mine in Merthyr Tydvil, in South Wales, and drew on a tramroad as many carriages as contained about 10½ tons of

iron, travelling at the rate of 5½ miles an hour, for a distance of 9 miles, without any additional water being required during its journey."* This high-pressure engine of Trevithick, by which carriages are impelled on common roads and on railways, is also applicable to every purpose for which the low-pressure or condensing engines of Watt are exclusively applied, and it has been thus characterised by the eloquent Mickleham: "It exhibits in construction the most beautiful simplicity of parts, the most sagacious selection of appropriate forms, their most convenient and effective arrangement and connection, uniting strength with elegance, the necessary solidity with the greatest portability, possessing unlimited power, with a wonderful pliancy to accommodate it to a varying resistance; it may, indeed, be called *The steam-engine.*" Mr. Hebert, from whose work† I have taken this extract, adds: "*Such admirable combinations of inventive skill were never before contained in the specification of a patent;*" and Mr. Clarke observes, that "In the establishment of the locomotive, in the development of the powers of the Cornish engine, and in increasing the capabilities of the marine engine, there can be no doubt that Trevithick's exertions have given a far wider range to the dominion of the steam-engine than even the great and masterly improvements of James Watt." ‡

Trevithick's Early Life (1771-1816).—Richard Trevithick was born on the 13th of April, 1771, in the parish of Illogan in Penwith, the most western hundred of Cornwall. His father, being the purser of several mines, could have given him the best education that the neigbourhood afforded; but our young engineer had no taste for school exercises, and being the only son who survived childhood, was allowed by his parents to spend his time as he pleased, so that most of his boyhood was passed in strolling over the mines amidst which he lived, in observing their engines and machinery, and in conversing with the miners, engineers, and others, who could give him information about them. Yet, even in this manner, with scarce any schooling, and with no books, he

* *Stuart on the Steam Engine*, (1825), p. 164.

† *A Practical Treatise on Railroads and Locomotive Engines.* By Luke Hebert, C.E., Editor of the *Engineer's and Mechanic's Encyclopædia;* the *History of the Steam-engine;* of the *Register of Arts, and Journal of Patent Inventions*, &c. (1837), p. 21.

‡ The *Railway Register* for February, 1847, edited by Hyde Clarke, Esq., pp. 87, 88. See also *Stuart on the Steam-Engine* (p. 162), who considers Trevithick's patent of 1802 "as forming an era in the history of the steam-engine."

acquired such practical knowledge of steam-engines and mine-machinery, that long before he attained his majority he was, to the utter astonishment of his father, appointed engineer to several mines. The father begged the mine-agents from whom the appointment had proceeded to reconsider what they had done, as he was sure his son could not, at so early an age, be qualified for so responsible an office. But having had sufficient proof to the contrary, they merely thanked him for his disinterested advice. In 1792, Trevithick was employed to test one of Hornblower's engines at Tincroft mine, near Redruth, and reported its duty to be 16 to 10 over Watt's. Prior to this, he had, with the assistance of William Bull (a workman previously employed in erecting Watt's engines in Cornwall), constructed several engines which did not come within the reach of Watt's patent.* Thus, at a very early age, Trevithick's great genius and self-acquired talents were practically acknowledged by the most competent authorities in Cornwall. Had he been, throughout his boyhood, a due attendant at school, he would doubtless have written a better hand and better English, and have qualified himself for succeeding his father in the lucrative office of a mine-purser. Fortunately, however, for mankind, his object was not to get rich, but to cultivate his inventive faculties (which he could not have done at school), and to let the world have the benefit of them, careless of his own personal interests. This, indeed, was throughout his life a prominent point of his character; and by neglecting to keep his discoveries within his own breast until patents for them had been obtained, others have had the credit for inventions suggested originally by himself.

On attaining his full stature, he stood more than six feet high, well formed, and without any tendency to corpulence. His muscular strength was such, that he could lift two blocks of tin, placed one on the other, weighing seven cwts. He was unassuming, gentle, and pleasing in his manners; his conversation was interesting, instructive, and agreeable, and he possessed great facility in expressing himself clearly on all subjects. Occasionally, a blunt expression would fall from him, particularly when obliged to go through an explanation a second time, on account of the inattention or dulness of his hearer; on such occasions he would sometimes exclaim, or rather ask (for he had no idea of giving offence), "How are you so dull?" His dress was plain and neat, and his general

* *Railway Register* for February, 1847, p. 86.

appearance such, that a stranger passing him in the street would have taken him to be some distinguished person.

His duties as engineer required him frequently to visit Mr. Harvey's iron-foundry at Hayle, who invited him to his house and introduced him to his daughter, Miss Jane Harvey. A mutual attachment was the result, and they were married on the 7th of November, 1797. Her brother, the late Mr. Henry Harvey, succeeded to the foundry, and became the most enterprising merchant in the west of Cornwall; to him the western part of the creek of Hayle is indebted for its extensive weirs and quays, and its vast reservoir, with tide-gates for clearing the mouth of the river from the sand, which would otherwise choke it. All these works were constructed on a sandy plain, covered by the sea at every tide.

After their marriage they lived at Plane-an-guary in Redruth, for a few months; then at Camborne, for ten years; afterwards in London, for two years; next at Penponds, in the parish of Camborne, for five or six years, at the house of his mother; and afterwards at Penzance, from which town he sailed for Peru on the 20th of October, 1816, leaving behind him his wife, four sons, and two daughters, all of whom are still living—Mrs. Trevithick being now (July, 1862) in her 91st year, and in the enjoyment of excellent health. His two youngest sons adopted the profession of their father, and have acquired considerable distinction as civil engineers.

Whilst in London in 1816, preparing for his departure for South America, his portrait—a good likeness—was taken by Linnell. This half-length oil-painting (24 by 20 inches) has lately been presented to the South Kensington Museum, where it is suspended among the portraits of distinguished men—a painted copy and a photographic copy having been given in exchange for it. From this picture, and from a *post-mortem* plaster cast, Mr. Neville Burnard, the Cornish sculptor, has made a marble bust, plaster copies of which adorn various institutions.

Most of his important discoveries were made before his departure for Peru. In 1802, while residing at Camborne, he, in conjunction with Mr. Andrew Vivian, who supplied the pecuniary means, took out the patent for his celebrated steam-engine, and, in the same year, erected a small one "at Marazion, which was worked by steam of at least 30 pounds on the square inch above atmospheric pressure. In 1804, he introduced his celebrated and valuable wrought-iron cylindrical boilers, now universally used in this county. . . . In

1811-1812, he erected a single-acting engine of 25-inches cylinder at Huel Prosper, in Gwithian, which, of course, had a cylindrical boiler, in which the steam was more than 40 lbs. on the square inch above atmospheric pressure; and the engine was so loaded that it worked full seven-eighths of the stroke expansively. . . . I believe (continues Mr. Henwood, from whom I am quoting) I have now satisfactorily shown, that Mr. Woolf, instead of being the *first* to introduce the expansive action of steam in one cylinder, was *positively preceded* several years by Trevithick."* Trevithick was the first who turned the eduction-pipe into the chimney, as stated by Mr. Gordon in his *Treatise on Elementary Locomotion*, by which means the draught in the chimney was greatly improved.†

Trevithick's attention had been engaged beneficially to the public on various other subjects besides the steam-engine, before his departure for Peru; but as they have been noticed in other publications,‡ I will pass on to the introduction of his high-pressure engine into the mountains of South America.

Trevithick in South America (1816-1827).—Of his admirable steam-engine, patented in 1802, as already noticed, Trevithick had made a beautiful model—little dreaming, whilst making it, that it would be the means of introducing him into a new world for the exercise of his genius and engineering talents. Some very rich silver-mines in the mountains of Peru had been abandoned from the mere want of machinery to extract the water. Mr. Uvillé, a Swiss gentleman, came to England from Lima in 1811, for the purpose of ascertaining whether any steam-engines could be successfully used in the rare atmosphere of those high mountains, and if so, whether

* *Philosophical Magazine and Annals of Philosophy for August*, 1831, in a letter to Richard Taylor, Esq., F.S.A., &c., by W. Jory Henwood, Esq., F.G.S., &c., p. 97.

† *Hebert on Railroads*, &c., p. 25.

‡ The following is an extract from the *Catalogue of the South Kensington Museum*, under the name of Trevithick: "Inventor and constructor of the first high-pressure steam-engine, and the first steam-carriage used in England; constructor of a tunnel beneath the Thames, which he completed to within a hundred feet of the proposed terminus, and was then compelled to abandon the undertaking; inventor and constructor of steam-engines and machinery for the mines of Peru (capable of being transported in mountainous districts), by which he succeeded in restoring the Peruvian mines to prosperity; also of coining machinery for the Peruvian Mint, and of furnaces for purifying silver-ore by fusion; also inventor of other improvements in steam-engines, impelling-carriages, hydraulic-engines, propelling and towing vessels, discharging and stowing ships' cargoes, floating-docks, construction of vessels, iron buoys, steam-boilers, cooking, obtaining fresh water, heating apartments, &c. Patents, Nos. 2599 (1802), 3148 (1808), 3172 (1808), 3231 (1809), 3922 (1815), 6082 (1831), 6083 (1831), 6308 (1832)."

they could be conveyed thither. Receiving no encouragement, he was about to return in despair, when, by mere accident, he saw this elegant model of Trevithick's high-pressure engine exposed for sale in a shop in London. Instantly the vast capabilities and simplicity, the enormous power and great portability of the machine, flashed upon his mind, and excited the most confident expectations of accomplishing his object. With this working model he hastened back to Lima, tried it in the highest elevations, found it perfectly successful, and having formed a company, took a second voyage to England to procure the necessary engines. A second time he was reduced almost to despair, for Boulton and Watt, the most distinguished engineers of their time, assured him that it was impossible to make engines of sufficient power small enough to be carried over the Andes; but Trevithick revived his hopes by undertaking to construct nine steam-engines of his own invention, in sufficiently small parts, to be conveyed on the backs of mules from Lima to the mines of Pasco, a distance of about 150 miles. The "Wildman," South Sea whaler, in which these engines, with other materials, were shipped, sailed from Portsmouth on the 1st of September, 1814. From the invoice, still preserved, I find that four of these engines were for pumping, had cost very nearly £1400. each, and were each of thirty-three horse-power; four others were winding engines, each of eight horse-power, the price of each being £210.; the ninth was a portable steam-engine of eight horse-power, used for rolling, and cost £400. The freight of this cargo to Lima was £1500., and the insurance £2300. Trevithick contributed from his own purse a considerable portion of this outlay, for which, and for his services, a share of not less than one-fifth in the adventure was allotted to him. Mr. Uvillé went to Lima with the engines, acccompanied by three Cornish engineers, one of whom was William Bull, Trevithick's earliest partner. The engines were safely landed—transported across the mountains,—and, on the 27th of July, 1816, the first steam-engine ever seen in South America was set to work at Santa Rosa, one of the mines at Pasco. The *Lima Gazette* of the 10th of August, 1816, in announcing this fact, says:—"We are ambitious of transmitting to posterity the details of an undertaking of such prodigious magnitude, from which we anticipate a torrent of silver that shall fill surrounding nations with astonishment."

On the 20th of October in the same year (1816), Trevithick sailed from Mount's-Bay in another South Sea whaler, with

more machinery, and landed at Lima on the 6th of February following, where he was immediately presented to the Viceroy of Peru, and received the most flattering attention from the inhabitants. The *Lima Gazette* of 12th February (now before me), after noticing the completion of a second engine, with a detail of the wonderful effects produced, thus proceeds:—"To this agreeable intelligence, we must add that of the arrival at Callao of the whale-ship "Asp," from London, having on board a quantity of machinery for the Royal Mint, and for constructing eight steam-engines equal to those already erected in Pasco. But the most important intelligence is the arrival of Don Ricardo Trevithick, an eminent professor of mechanics, machinery, and mineralogy; inventor and constructor of the engines of the last patent, who directed in England the execution of the machinery now at work in Pasco. This professor, with the assistance of the workmen who accompany him, can construct as many engines as shall be wanted in Peru, without sending to England for any part of these vast machines."* The following is an extract from a private letter of Trevithick on this occasion:—"The Lord Warden was sent from Pasco to offer me protection and to welcome me to the mines. They have a Court over the mines and miners the same as the Vice-Warden's Court in England, only much more respected and powerful. The Viceroy sent orders to the military at Pasco to attend to my call, and told me he would send whatever troops I wished with me. As soon as the news of our arrival had reached Pasco, the bells rang, and they were all alive, down to the lowest labouring miner, and several of the most noted men of property have arrived here (150 miles) on this occasion, and the Lord Warden has proposed erecting my statue in silver."

What treasures were yielded by the mines before the Civil Wars put a stop to them, I do not know; nor am I aware how Trevithick afterwards employed himself, although it appears that he joined Earl Dundonald (then Lord Cochrane), and was for some years with him in South America. At length, he returned to England, having crossed the Isthmus of Panama, encountering hairbreadth escapes, and extraordinary adventures, and landed in Falmouth, in complete destitution, on the 9th of October, 1827.†

* This is a literal translation of the passage.

† Since writing the above, I have seen the *Supplement to the Mining Journal* for 12th February, 1859, containing some account of Trevithick during his absence in South America, from which the following are extracts:—"The

Whilst with Lord Cochrane, he invented a most ingenious gun-carriage, of which, with its mounted gun, he showed me a beautiful model. By this invention "a single-decked ship will carry a greater number of guns on one deck than a double-decked ship on both decks, be worked with less than one-third of the hands, and the guns fired with precision five times as fast as they are at present." What has become of it, I cannot learn, nor whether it was ever tried in the navy. The plans and specifications are still in the possession of his family. So, also, are notes and maps which he made while crossing the Isthmus of Panama, of the best line in which a road or canal might be made to traverse it.

Trevithick's claims on his country.—The first thing to which Trevithick applied himself on his return from South America, was to replenish his purse. Justly considering himself entitled to remuneration from his country, he furnished my late father (his solicitor) with instructions for a petition to the House of Commons for that purpose. The petition was prepared accordingly in December, 1827, and the following are extracts from it:—

"That this kingdom is indebted to your Petitioner for some of the most important improvements in steam-engines, for which he has not been remunerated, and for which he has no prospect of being remunerated, except through the assistance of your Honourable House.

"That the duty performed by Messrs. Boulton and Watt's improved steam-engines in 1798 (as appears by a statement made by Davies Gilbert, Esq., and other gentlemen, associated for that purpose) averaged only 14½ millions pounds of water lifted one foot high by one bushel of coals, although a chosen engine of theirs, at Herland, under the most favourable circumstances, lifted 27 millions—the greatest duty ever performed, until your Petitioner's improvements were adopted, since which, the greatest duty ever performed has been 67 millions, being much more than double the former duty.

"That prior to the invention of your Petitioner's boiler, the

patriots kept him up in the mountains as a kind of patron and protector, and the royalists looking upon Trevithick as the great means whereby the patriots obtained the sinews of war, ruined his property wherever they could, and mutilated his engines. . . . It is said that he had to make his escape, and after great difficulties, succeeded. He then visited various parts of the West Coast; but it appears that the last four years were chiefly spent in Costa Rica, in the countries now so well known as the route of the Nicaraguan transit, and the scene of General Walker's filibuster warfare, where he engaged in mining with his friend, Mr. John Gerard."

most striking defect observable in every steam-engine was the form of the boiler, which in shape resembled a tilted waggon, the fire being applied under it, and the whole surrounded with mason-work. That such shaped boilers were incapable of supporting steam of a high temperature, and did not admit so much of the water to the action of the fire as your Petitioner's boiler does, and were also in other respects attended with many disadvantages.

"That your Petitioner directed his attention to the invention of a boiler which should be free from these disadvantages, and after having devoted much of his time, and nearly all his property, in the attainment of his object, at length succeeded in inventing and perfecting that which has since been generally adopted throughout the kingdom.

"That your Petitioner's invention consists principally in introducing the fire into the midst of the boiler, and in making the boiler of a cylindrical form, which is the form best adapted for sustaining the pressure of high steam.

"That the following very important advantages are derived from this invention. This boiler does not require half the materials, nor does it occupy half the space required for any other boiler; no mason-work is necessary to encircle it; accidents by fire can never occur, as the fire is entirely surrounded by water; and greater duty can be performed by an engine with this boiler (and with less than half the fuel) than has been accomplished by any engine without it. These great advantages render this small and portable boiler not only superior to all others used in mines and manufactories, but likewise the only one which can be used with success in steam-vessels or steam-carriages. The boilers in use prior to your Petitioner's, could never, with any degree of safety or convenience, be used for steam-navigation, as they required a protection of brick and mason-work to confine the fire with which they were surrounded, and still there was danger of accidents by fire resulting from the rolling and pitching of the ship.

"That, had it not been for your Petitioner's invention, the late important improvements in the use of steam could not have taken place, as none of the old boilers could have withstood a pressure of more than 6 pounds to the inch beyond the atmospheric pressure, whilst your Petitioner's is not only very commonly worked at a pressure of 60 pounds to the inch, but is capable of withstanding a pressure of above 150 pounds to the inch.

"That as soon as your Petitioner had brought his invention into general use in Cornwall, and had proved to the public its immense utility, he was obliged, in 1816, to leave England for South America, to superintend extensive silver mines in Peru, from whence he did not return until October last. That at the time of his departure, the old boilers were rapidly falling into disuse, and when he returned, they had been generally replaced by his own.

"That the engines in Cornwall (which are more powerful than those used in any other part of the kingdom) have now your Petitioner's improved boilers, and it appears, from the monthly reports, that these engines, which, in 1798, averaged only 14½ millions, now average three times that duty with the same quantity of coals, making a saving to Cornwall alone, of about £100,000. per annum; and an engine at the Consolidated Mines, in November, 1827, performed 67 millions, which are 40 millions more than the duty performed by Boulton and Watt's chosen engine at Herland, as before mentioned.*

"That, but for your Petitioner's invention, the greater number of the Cornish mines, which produce nearly £2,000,000. per annum, must have been abandoned.

"That your Petitioner has also invented the iron stowage water-tanks and iron buoys, now in general use in His Majesty's Navy, and with merchant ships. That 25 years ago your Petitioner likewise invented the steam-carriage.

"That all the inventions above alluded to have proved of immense national utility, and your Petitioner has not been reimbursed the money he has expended in perfecting them.

"ST. ERTH, HAYLE, *December*, 1827."

The letter from Trevithick, enclosing the instructions for this petition, was dated the 20th of December, 1827, and contained the following postscript:—"I was at Dolcoath account on Monday, and made known to them my intention of applying to Government, and not to individuals, for remuneration. They are ready to put their signatures to the petition, and so will all the county."

Soon after the petition had been prepared, Trevithick met with a partner, who supplied him with the money he required for perfecting his never-ceasing inventions. This being all he wanted, the petition was never presented, and he gladly resumed the kind of life which he had pursued for so many

* In all the Cornish mine-engines, the steam is *produced* by Trevithick's boiler and *reduced* by Watt's condenser.

years with so much success in Camborne, when in partnership with Mr. Vivian. Thus assisted, he obtained a patent in 1831, for "an improved steam-engine;" and another, in the same year, for "a method or apparatus for heating apartments;" and a third on the 22nd of September, 1832, for "improvements on the steam-engine, and in the application of steam-power to navigation and locomotion." This was the last patent he took out, and "he died at Dartford, in Kent, on the 22nd of April, 1833, leaving no other inheritance to his family but the grandeur of his name and the glory of his works."*

Whilst he lived he was but little known, being so exclusively occupied with his inventions, that, independently of his literary disqualifications, he had neither time nor inclination to be the herald of his own achievements, and therefore some of his great inventions were (particularly during his eleven years' absence in South America), strangely ascribed to others. But as he was clearly the inventor of the high pressure steam-engine, of the steam-carriage, and of that boiler, without which (or a modification of which), no steam-boat could have crossed the Atlantic, he has undoubtedly contributed more to the physical progress of mankind than any other individual of the present century.

* *Railway Register* for February, 1847, p. 96.

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LIST OF PLATES.

ERRATA.

Page 1, line 28. *Add*, "The antiquities of the adjoining eastern parishes I shall regard as belonging to the peninsular district."
Page 12, line 32. *Dele* "but which is now included in the chapelry of Marazion." See p. 242, line 16.
Page 38, line 13. *For* "Ive's" *read* "Ives'."
Page 39, line 15. *For* "288" *read* "16."
Page 165, line 23. *For* "thousands of years" *read* "many centuries.
Page 165, line 31. *For* "two" *read* "three."
Page 168, lines 16 to 28. *To be displaced by the lines* 24–38 *on p.* 242.
Page 168, line 32. *For* "that" *read* "those."
Page 178, lines 2, 3, 30, 32. *For* "Kimyell" *read* "Kymyell."
Page 185, line 4. *For* "South" *read* "East by South."
Page 194, 37. *For* "1853" *read* "August, 1852, p. 519."
Page 221, line 5. *The inverted commas should begin with* "our."

A MAP OF SOME

OF THE

Antiquities of the Landsend District

OF

CORNWALL.